

# HOUSES INTO FLATS

KEY TO CONVERSION



*Extract from The Bath Report prepared by the Society for the Protection of Ancient Buildings, in collaboration with the Bath Preservation Trust :—*

*“ These beautiful terraced houses that are a source of Bath’s chief pride must not be allowed to disappear through sheer lack of imagination. There is a better purpose for them to fulfil than to become the ghosts of a past age. They can undoubtedly have a useful future through careful adaptation to modern requirements.”*

# HOUSES INTO FLATS

KEY TO CONVERSION



ASCOT GAS WATER HEATERS LIMITED  
43 PARK STREET, LONDON, W.1

1947

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# F O R E W O R D

By the Rt. Hon. THE EARL OF LIMERICK, K.C.B., D.S.O., T.D.

CHAIRMAN, ASCOT GAS WATER HEATERS LIMITED



THE most urgent social problem now facing the nation is the housing of the people. Not less than four million new dwellings are needed in the next ten years.

Three main factors contribute to this need: many hundreds of thousands of dwellings have been destroyed or damaged by enemy action ; all new domestic building has been stopped during the six years of war ; lastly, the size of the average British family is now smaller than in Victorian days, and we therefore need a larger number of small separate dwellings to house the same number of people as before.

Conversion of existing property into flats is imperative because new construction alone cannot meet our needs. In these circumstances, not only must the best use be made of available materials, skill and labour in all building work, but also imagination and resource must be brought to bear to the greatest extent in converting for occupation all accommodation that can be made available for that purpose.

It is to the solution of this urgent problem—the problem of conversion—that Ascot Gas Water Heaters Limited seek to make their contribution in this book.

On behalf of the Company, I wish to express gratitude for the collaboration of leading authorities on the main aspects of this task. Similarly I hope that those on whom falls the main burden of advice or decision, namely the local authorities, housing managers, architects, builders and owners, may find this book a practical guide in the adaptation of the varying types of old buildings to new needs.

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# INTRODUCTION

By F. R. YERBURY, HON. A.R.I.B.A.



It would seem that for a very long time the conversion of large houses into flats will be accepted as a useful contribution to the solution of the housing problem, a problem facing people of all income levels. Under post-war conditions, a very large house, either in the centre of the town, the suburbs or even in the country, is seldom regarded as a desirable residence, but rather as an encumbrance and a tiresome burden. The difficulties of upkeep, absence of service, reduction of incomes by taxation, and numerous other factors have removed all glamour from the possession of a large establishment.

Many who would gladly shed the responsibility of a town or country mansion in exchange for a medium sized house, newly built or otherwise, are faced with the fact that it may be a very long time indeed before such a house will be easily obtainable. The splitting up by the owner of his large house into more easily managed self-contained apartments—occupying one himself and letting the others—offers a tempting and practical way out of the dilemma. So much for the owner occupier. But there is also the owner who holds a freehold or a long lease of large unmanageable properties which, owing to their size and fast approaching obsolescence, were becoming unlettable even before the war. Probably many of these big houses would, but for the war, have been demolished to make way for up-to-date flats. There is very little prospect of this happening for some years, and, with the eager demand for living accommodation for all classes, a new life can be given to these, sometime gaunt, relics of an opulent age, by the modernising of the internal services and the division into homes for a number of servantless families. There are thousands of such properties in London and other cities, many, although bombed and neglected, offering potential flat accommodation to the countless people looking in vain for a home of their own.

It would be interesting to obtain a census of town and suburban houses too unmanageable for a single family, and attempt to estimate the approximate number of self-contained apartments or flats which could be created by their conversion. It is fairly certain that the resultant figure would show the possibility of making a really handsome contribution to the supply of more up-to-date accommodation.

Although many of the now obsolete houses would entail no architectural loss if they were destroyed, there are in the various cities terraces of fine Georgian residences built in the manner of their time—to suit the then existing living conditions—which are rightly regarded as a precious heritage of fine architecture. No one would like to see these destroyed, and yet without some kind of conversion to present-day needs they must in time become derelict.

The City of Bath provides excellent examples of fine architecture depending largely for its interest on those grand terraces, gardens and squares as will be seen in one of the illustrations in this book. This grandeur can still be retained under modern conditions by careful adaptation and the creation of self-contained family apartments.

With the ever increasing difficulties of traffic and transport, so harassing to many city workers with long journeys to outlying suburbs, the conversion of some of the larger houses within short distances of the City itself would offer an extremely attractive proposition. Instead of spreading the town by the building of new suburbs, there surely must be great opportunities in the existing well laid out streets with their gardens and trees such as we find in areas like South Kensington and Holland Park which are all within a few minutes of the West End and the City.

The illustrations in this book will show that the problem of conversion is by no means easy : there are many snags and unforeseen difficulties. But the Authors who have contributed to this book have attempted to draw attention to some of these and have given the benefit of their practical experience in producing possible solutions. The financial, legal and social sides have been dealt with, and chapters on these subjects, together with those covering services and amenities, should be of the greatest use to all those who will be engaged in the future on the work of conversion.

# BUILDING REGULATIONS AND THE CONVERSION OF HOUSES INTO FLATS

CHARLES WOODWARD, A.R.I.B.A.



AMONG the many matters to be considered, in regard to the conversion of a house or houses into flats, is whether there are restrictions in a lease which would prohibit such a change of user. If consent to a conversion is refused by a lessor, there is power under the Law of Property Act 1925, section 84, to discharge or modify restrictions if they would impede the reasonable user of the land, or if the restrictions ought to be deemed obsolete, having regard to changes in the character of the property or the neighbourhood. Under the Housing Act 1936, section 163, the terms of a lease can be varied if, owing to changes in the character of the neighbourhood, the house could not readily be let as a single tenement but could readily be let for occupation if converted.

Regulations affecting conversions can be conveniently considered under two heads, depending upon whether the property is in the area controlled by the London County Council or whether it is outside that area.

## LONDON COUNTY COUNCIL AREA

In the L.C.C. area the London Building Act 1930, the London Building Acts (Amendment) Act 1939, the Housing Act 1936, and the Public Health (London) Act 1936 are the Acts to be considered, together with the byelaws made by the L.C.C. under the London Building Act (Amendment) Act 1935. The provisions proposed to be included in Town Planning schemes might also affect the project, and an application under the Interim Development Order might be necessary. Where a Town Planning scheme is in operation its contents should be consulted.

### *London Building Act 1930*

Most of this Act has been repealed by the London Building Acts (Amendment) Act 1939, but Part 5 remains, and controls light and ventilation to habitable basements, space at rear of domestic buildings, courts within buildings and windows of habitable rooms opening into such courts. The provisions as to habitable basements apply to domestic buildings erected after 31st December 1894 and to the space at the rear of domestic

buildings in a street formed after that date. This provision is modified if the street was formed before 1st January 1895.

### *London Building Acts (Amendment) Act 1939*

Under this Act a building may not be converted unless it complies with the London Building Acts and byelaws, but the L.C.C. have power to consent to deviations. Conversion includes change of user even though there is no structural alteration. It is an offence under this Act to occupy or let a building where the space at the rear is not as required by Part 5 of the 1930 Act.

Under this Act buildings may not, without the consent of the L.C.C., be united unless they conform to the requirements of the London Building Acts and byelaws. For this purpose the united buildings would be considered as being one building. This provision would affect a proposal to unite two or more houses for conversion into flats, and is contained in Part 3 of the Act.

A further provision is that the principal staircase must be ventilated by an exterior window or skylight.

The provisions for means of escape in case of fire are set out in Part 5 of this Act. In this connection three considerations may apply to conversions: firstly, in respect of buildings in which sleeping accommodation is provided for more than twenty persons; secondly, in respect of buildings exceeding two storeys in height, let in flats, and having a storey at a greater height than twenty feet; and thirdly, buildings with a storey which is at a greater height than forty-two feet. The requirements as to means of escape will depend on the circumstances of each case, and early consultation with the L.C.C. is desirable and will be found most helpful. "Height" in relation to a storey is defined at the beginning of Part 5.

Building rights, and adjoining owners' rights, in relation to party walls, are contained in Part 6 of this Act. This Part repealed the provisions as to party-walls in the 1930 Act and amended the law in some respects. Reinforced concrete foundations may not be placed on the land of an adjoining owner without his written consent. If he consents, he may require the building-owner to take the reinforced foundations to a greater depth, or to make them of sufficient strength for any future building which the adjoining owner may have in mind. The adjoining owner must pay the expense of this work.

Additional use of a party-wall must be paid for, having regard to the cost of labour and materials at the time the use is made.

The third Surveyor can make an award if no two of the three surveyors can agree on an award.

### *Public Health (London) Act 1936*

Under this Act there are restrictions on the use of "underground rooms" as dwellings. An underground room is a room where the floor-level is more than three feet below the footway of the street—or of the surface of the ground adjoining, or nearest to, the room. An underground room is occupied as a dwelling if a person passes the night in it. Section 132 defines the constructional conditions which must obtain if an underground room is to be used, or let, as a dwelling.

Under the Act the Borough Council is the sanitary authority in connection with drainage matters. The Council administers the drainage byelaws made by the L.C.C. In the City of London the Common Council is the sanitary authority, and administers the drainage-byelaws relating to the City.

### *Byelaws for the Construction and Conversion of Buildings made under the London Building Act (Amendment) Act 1935.*

A converted building must comply with these byelaws, which came into operation on 1st January

1938. Notice of any intended work must be served on the district surveyor, with such plans, sections, calculations or particulars as he may reasonably require.

Rules as to reinforced concrete, steel-frame construction, thickness of walls, extent of window openings and the construction of fireplaces and flues will be found in the byelaws.

In a building which is to be tenanted by different persons and which exceeds 25 squares in area or exceeds 125,000 cubic feet, the floors, lobbies, corridors, passages, landings and steps must be constructed of fire-resisting materials and must be enclosed with incombustible material not less than three inches thick. The doors and frames in the enclosures must be of fire-resisting material.

Habitable rooms must be at least 8 ft. 6 in. high, and at least 8 ft. high if in the roof. Bath-rooms must be ventilated to the satisfaction of the district surveyor. A habitable room over a garage must have a floor pugged with three inches of incombustible material, the ceiling of the garage being lined with asbestos-sheeting.

The byelaws provide alternative methods of ventilating a habitable room in cases where there are no windows opening directly into the open air.

Incombustible material must conform to the test in British Standard Specification No. 476.

The byelaws for the use of timber in the construction and conversion of buildings must be complied with, and notice of the proposed work must be given to the district surveyor, with plans, calculations or other particulars that he may reasonably require. The byelaws contain rules for superimposed loads, calculations for stresses in timber and rules for the sizes of timbers where the stresses are not calculated.

An appeal against a requirement of the district surveyor in respect of any byelaw may be made to a Court of Summary Jurisdiction. The L.C.C. have power to modify or waive the requirements of any byelaw on such terms as they think fit. An appeal from a refusal of the L.C.C. to modify or waive byelaws in respect of steel-frame or reinforced concrete construction lies to the Tribunal of Appeal constituted under Part II. of the 1939 Act.

### *Housing Act 1936*

This Act is chiefly concerned with housing for the working-classes, and there are provisions relating to the conversion of a house into two or more separate and self-contained flats. The area of a separate and self-contained flat must not be less than 550 ft. super, reduced to 500 ft. super if the Minister of Health so determines. The area is to be calculated in accordance with rules made by the Minister. In the Fifth Schedule to this Act, the permitted number of persons to each room is given according to the floor-area of the room. This is in relation to overcrowding.

Under this Act the local authority can give financial assistance to an owner desiring to convert.

#### *Definitions*

"Habitable" means a room constructed or adapted to be inhabited. (*London Building Act 1930.*)

"Inhabited" means a room in which a person passes the night, or one used as a living-room. (*London Building Acts (Amendment) Act 1939.*)

"Flat" means a separate and self-contained set of premises, constructed for use as a dwelling and forming part of a building from which it is divided horizontally. (*Housing Act 1936.*)

"Block of Flats" means a building which contains two or more flats, and which consists of three or more storeys exclusive of any storey which

is constructed for purposes other than those of a dwelling. (*Housing Act 1936.*)

"Tenement house" means a house occupied by any person of the working-class which is wholly or partly let in lodgings, or which is occupied by members of more than one family. (*Public Health (London) Act 1936.*)

"Working-class" includes mechanics, artisans, labourers, and others working for wages, hawkers, costermongers, persons not working for wages but working at some trade or handicraft without employing others except members of their own families, and persons other than domestic servants whose income in any case does not exceed an average of three pounds a week, and the families of any such persons who may be residing with them. (*Housing Act 1936. Eleventh Schedule.*)

## BUILDING REGULATIONS OUTSIDE THE LONDON COUNTY COUNCIL AREA

The Acts to be considered in areas outside the L.C.C. area are the Public Health Act 1936, the Housing Act 1936 and the Building Byelaws relating to buildings. In some cases there are private Acts of Parliament which may have provisions affecting conversions.

### *Public Health Act 1936*

This Act applies to England and Wales, and excludes London, except for some provisions which do not affect conversions.

The Local Authority may require existing drainage to be made satisfactory and, if there is a sewer within 100 ft. of the site, may require the owner to connect the drainage to the sewer if it is reasonably practicable, and if the owner is entitled to lay a drain across intervening land.

If the sewer is more than 100 ft. from the site, the Local Authority may at their own expense construct the sewer to within 100 ft., and the owner can then be required to connect the drainage to the sewer. The Local Authority has the same powers in respect of water supply.

Satisfactory means of access from a house to a street must be provided for the removal of refuse, and a Local Authority must reject deposited plans which are defective in this respect. Any dispute on this point can be referred to, and determined by, a Court of Summary Jurisdiction.

Satisfactory means of escape in case of fire can be required by a Local Authority where the building is let in flats or tenement dwellings and exceeds two storeys in height, or where the floor of any upper storey is more than 20 ft. above the surface of the street or ground on any side of the building.

Byelaws may be made under this Act with respect to structural alterations and extensions of buildings which effect a material change in the use of the

building. A material change is defined as the occupation, by two or more families, of a building originally constructed for one family. Such byelaws may be relaxed with the consent of the Minister of Health if in any particular case they would be unreasonable.

Plans of conversions deposited with a Local Authority in accordance with byelaws must be passed unless they contravene the byelaws. If the plans are rejected, the notice of rejection must specify the defects in the plans and the byelaw or the Section of this Act which is contravened. An appeal against the decision of the Local Authority lies to a Court of Summary Jurisdiction, or to the Minister of Health, on a joint application by the person proposing to execute the work and the Local Authority. The Minister's decision is final, but he must state a case on any question of law for the opinion of the High Court.

### *Housing Act 1936*

The notes made above under this Act, in reference to conversions in the L.C.C. area, will apply also to areas outside the L.C.C. areas.

### *Building Byelaws*

Building byelaws have been revised under the Public Health Act 1936, and it would be necessary in each case to examine the byelaws of the locality to ascertain the provisions relating to conversions.

The following provisions may be contained in revised byelaws :

A material change of user, as defined above under the Public Health Act 1936, would require notice to the Local Authority and compliance with the byelaws.

The walls enclosing a main staircase must have a suitable degree of fire-resistance.

If the building has only two storeys, but exceeds 24,000 cubic feet, the stairs and landings of a main staircase must be so constructed or protected on the under-side as to have a suitable degree of fire-resistance.

If the building has more than two storeys, the stairs and landings of a main staircase must be so constructed or protected on the under-side as to have a suitable degree of fire resistance, and the floor and its supports, between two sets of rooms in separate occupation, must be similarly constructed or protected. And if, in addition, the building exceeds 24,000 cubic feet, all lobbies, corridors, passages and landings must be similarly constructed or protected.

Where there is an external staircase, or some other suitable external means of escape from every storey above the ground-storey in which there is a set of rooms in separate occupation, the above requirements will not apply if the building does not exceed 60,000 cubic feet and has not more than two storeys. If the building exceeds 60,000 cubic feet and has more than two storeys, the requirements will apply only to the main staircase, and to every room, lobby, corridor, passage or landing forming the main approach to the external staircase or other external alternative means of escape.

Open spaces must be provided in front and at the rear of buildings for habitation. The open space in front is regulated by the width of the street. The open space at the rear must not be less than 150 square feet, but the distance across the open space from the back wall of the building to the rear boundary must be increased according to the height of the building. No alteration or addition to a building may be made which would decrease the open space required by the byelaws.

The position of windows and the portions which must open are defined by byelaws, and windows to habitable rooms opening on to an enclosed court, or on to a court open on one side, must comply with the conditions laid down.

A staircase used in common, which is above the ground-storey and not open to the external air, must be adequately ventilated.

The height of habitable rooms must not be less than 8 ft. The height of rooms in a roof may be modified.

A habitable room over a motor-garage must have its floor protected on the under-side by a ceiling of incombustible material, or the floor as constructed must have an appropriate degree of fire-resistance.

Foundations, damp-courses, site-concrete, walls, roofs and drains must comply with byelaws.

### *Town Planning*

The provisions proposed in Town Planning schemes might affect the intended conversion, and an application under the Interim Development Order would be necessary. Where a Town Planning scheme is operative its contents should be consulted.

### *Conversion of War Damaged Houses*

In regard to the repair of war-damaged houses, it may be advantageous to convert these into flats, and to receive from the War Damage Commission the permissible amount payable under the War Damage Act, 1943.

Qualification for such a payment is determined by tests applied in each case by the Commission, the tests being designed to answer the question as to whether, looking at the proposed works as a whole, the property will still be the same as before the damage, even though it has been altered or added to. This would be decided on the facts in each case.

The permissible amount payable under the Act is the sum which a reasonable and prudent owner would himself require to build a property substantially the same in shape, size and general character as, and equivalent in use, quality and value to, the property as it existed before the war damage. The Commission, however, cannot pay more than is actually spent, nor more than the works carried out might reasonably be expected to cost.

The Act does not allow the Commission to pay for anything except "making good." But making good, with alterations and additions, may now be read as including additions to the site as well as to the buildings, the addition to the site being contiguous.

# CONVERSION COSTS AND ESTIMATED RETURNS

F. H. RUSSELL, F.I.A.A. & S.



BEFORE the War the conversion of large out-of-date houses into flats restored many a derelict property to useful and profitable life. The acute shortage of living accommodation now confronting the country has resulted in an increased interest in this method of providing homes.

Although some progress is now being made in conversions carried out by Local Authorities, very little, if any, encouragement has so far been extended to the private investor to assist with such development. It may, however, be surely anticipated that the time is not far distant when the restrictions now imposed will be removed, or at any rate relaxed sufficiently to enable private enterprise to enter the field.

It must be confessed that many of the conversions carried out in the past have been of a haphazard nature, having for their objective not so much the convenience and comfort of the tenant as the exploitation of an opportunity to make quick profits with a minimum outlay. Then, again, property owners have too frequently undertaken conversions without giving sufficient preliminary consideration to the many problems involved, and have, in consequence, embarked upon unprofitable speculations which reasonable precautions would have prevented.

One of the more common mistakes has been the selection of an unsuitable location for the class of flat provided, through failure to realise that changing conditions in the district, such as the growth of workshop and factory buildings, and unpleasant trade processes in the immediate vicinity, were driving away the class of tenant for which it was hoped to cater.

Another frequent reason for failure has been the neglect of the investor to employ a qualified architect to prepare the plans and specification for the proposed work. Very often unfavourable schemes have been carried out with the co-operation of an enterprising builder whose estimate of cost has proved to be unduly optimistic, with the result that when the final bill has been presented the investor has received an unpleasant shock. It cannot be too much emphasised that, however attractive, at first glance, a proposed scheme may appear on paper, the advice and guidance of an architect accustomed to the class of work should be obtained before any commitments are made. In some cases, although it might appear to the lay mind that a particular property offers an admirable opportunity for a sound and profitable conversion, professional investigation may disclose that the structural alterations involved are of such a costly nature as to render the scheme a useless one financially. The architect, amongst his other duties, will also ascertain whether the proposed scheme is affected by town-planning, and will ensure that the building bye-laws and regulations are observed.

A specification of the work and, if the extent of the work justifies it, a bill of quantities must be prepared, and the more complete and detailed these are the more satisfactory will be the result of the tenders when obtained from the builders.

Having decided that a particular property fulfils the necessary essentials for an economical and practical conversion, and ascertained that the estimated cost of conversion is within reasonable limits, the next step is to estimate the net annual return which may be safely anticipated. To this part of the project considerable care and thought must be given, as a miscalculation at this stage cannot be rectified afterwards.

Starting with the rents to be expected, caution should be exercised in fixing these. It is far better to err on the side of an underestimate than to anticipate high rents which, although obtainable under abnormal conditions, cannot be maintained when conditions return to normal.

Having decided that the rents proposed are fair and reasonable for the accommodation offered, and normal for the district, the question of capital outlay and estimated outgoings must then be considered.

These may be illustrated by hypothetical examples, as follows :

### EXAMPLE I

Assume that the building to be converted consists of two large adjoining semi-detached houses of three storeys, each house containing 14 rooms and usual offices. The property is freehold but is in poor repair and can be purchased for £3,250.

The proposal is to convert the two houses into six self-contained flats, the accommodation of each being one sitting room, two bedrooms, kitchenette, bathroom and W.C.

Sketch plans have been prepared and the estimated cost of the conversion and repairs has been calculated at the sum of £2,000, including professional fees.

The rentals receivable have been estimated as follows :—

Two ground floor flats at £100 per annum	£200
Two first floor flats at £150 per annum	300
Two second floor flats at £125 per annum	250

Total rents inclusive of rates and taxes .. £750

Before detailing the outgoings, it may be of interest to explain at this stage what they are likely to be and how they are arrived at and calculated.

#### I. Rates

Upon conversion into self-contained flats, a property will be the subject of a reassessment by the Assessment Committee for the district. The new gross and rateable values will be entered in a Provisional Valuation List. The ratepayer has the right to object on the ground of unfairness or incorrectness. The gross value placed upon a property is understood to be the rent which a tenant might reasonably be expected to pay from year to year if such tenant undertook to pay all usual tenants' rates and taxes and the landlord paid the

cost of repairs, insurance and other outgoings necessary to keep the property in a state to command the rent.

The assessment is arrived at by a comparison with rental values of similar accommodation in the locality, and, in practice, the gross value, except in unusual circumstances, will more often than not be the amount of the actual rent at which the flat is let, after deduction of the usual tenants' rates and taxes, and assuming that the tenant is not liable for repairs.

The rateable value is the amount left after deduction from the gross value of the average annual cost of repairs, insurance and other expenses. It is very difficult to give a percentage figure for this deduction, which varies according to the services and amenities provided by the Landlord, such as lifts, furnishings to stairs and hall, refrigerators, etc. For general estimating purposes, however, a deduction of 40 per cent. from the gross value may be taken as normal.

The varying amount of rates in the £ levied in the different Boroughs has, of course, also to be taken into account when computing the outgoings.

#### II. Water Rate

The assessment for this follows the amount of the Rateable Value for Local Rates.

#### III. Insurance

The annual premium for insuring a building, such as that under review, against fire has generally been taken at the rate of 1s. 6d. per cent per annum on the total value. It is now more usual to effect a Comprehensive Insurance which, in addition to fire risks, covers Property Owners' Liability for claims by Third Parties arising from accidents.

The premium for this combined insurance is generally about 2s. 3d. per cent.

#### IV. *Lighting of Hall and Staircase*

This is a small item which may be further reduced, where a housekeeper is not employed, by the installation of time switch control.

#### V. *Removal of Dust from Tenants' Bins; Cleaning Stairs, etc.*

The figure for this is obviously dependent on labour involved and the nature of the stair coverings, if any. In some cases it is possible to provide living accommodation for a resident housekeeper as part-payment for services.

#### VI. *Repairs*

Annual allowance for external repairs is usually 5 per cent of the gross income.

Internal repairs are sometimes made a responsibility of the tenant. The owner should, however, be prepared to bear some part of the cost of these where, for various reasons, the amount is not recoverable from the tenant.

After the foregoing explanation of the various outgoings to be anticipated, the estimated deductions may now be considered.

Estimated rents, as above £750 0 0

#### OUTGOINGS

Rates—

Total gross assessment on the 6 flats, say £500

Deduct for repairs, insurance, lighting and cleaning stairs, etc., 40% 200

Rateable value £300

Calculating rates at 14s. in the £ £210 0 0

Water Rate 8½% on £300 25 10 0

Insurance 2s. 3d. per cent on, say, £6,000 6 15 0

Lighting stairs and hall 6 0 0

Cleaning stairs and hall and removal of dust from tenants' bins, etc. 70 0 0

Allowance for external repairs 5% 37 10 0

Ditto for internal repairs 7½% 56 5 0

Management 5 per cent 37 10 0  
449 10 0  
£300 10 0

Thus showing a return of just under 5¼% on the capital outlay of £5,250.

An outgoing which has not been included in the above calculation is an allowance for "empties." A figure for this of 10% on gross rentals has in the past been a usual one, but with a block of flats planned on modern and convenient lines,

with all up-to-date amenities, such a deduction, in view of present day conditions, may safely be ignored.

A contingency in respect of Agent's letting commission may be allowed, but this is not an annual outgoing.

It may be mentioned that, in the case of a conversion such as that instanced above, an owner himself will sometimes occupy one of the flats and collect the rents, in which case the 5% for management will not figure in the outgoings.

#### EXAMPLE II

For this example assume the property under consideration to be identical with the foregoing, but instead of a Freehold it is a Leasehold with 45 years of the lease unexpired and held at a ground rent of £15 per annum each house.

In this case the cost of conversion will be increased by additional professional costs incurred in submitting plans and specifications for approval on behalf of the freeholder, and obtaining a licence from him permitting the proposed alterations.

The leases have been purchased with vacant possession for say £2,000.

The conversion costs and necessary repairs, including professional charges, will amount, it is estimated, to £2,100.

The figures for outgoings will therefore be varied from Example I, as follows:

Estimated rents, as before £750 0 0

#### OUTGOINGS

Taken as in foregoing example 449 10 0  
Plus Ground Rent 30 0 0  
479 10 0

Annual return £270 10 0

A little over 6½%

But as the investment, being leasehold only, is a depreciating one, a Sinking Fund should be provided to reproduce the capital upon the expiration of the lease.

Such a fund may be accumulated by taking out a Policy with an Insurance Society. The rate of annual premium payable, to amount to £4,100 at the end of 45 years, is about £1 11s. 6d. per cent.

This equals a payment of 64 10 0

A Sinking Fund therefore would reduce the annual net return to per annum £206 0 0

This shows a net return of 5% on the capital outlay of £4,100.

Although of course it should be done, it is remarkable to find that the majority of leaseholders neglect to make provision for the future by investing in a Sinking Fund.

The two examples given should be a sufficient guide to enable a balance sheet to be prepared in respect of the general class of conversion met with, but of course the adaptability or otherwise of a particular property will affect the cost of the necessary alterations, and thus increase or lessen the amount of the annual net-return.

It will be noted that in the two foregoing illustrations, no allowance has been made for central heating or constant hot water. This is for the good reason that such services rarely prove to be satisfactory or economically possible when installed in a small block of converted flats. The cost of fuel and labour involved in stoking and attending to the boiler is disproportionately high, and furthermore, where such services are installed, it is only natural that the tenants expect water at boiling point to be on tap at all hours of the day and night and are dissatisfied if it is not available. A far more satisfactory method in such cases is the provision of unit supplies in each individual flat, and the modern hot water gas-heater, such as the latest type of Ascot, ensures that all the tenants can obtain as much hot water as they require at any time of day or night, and the owner of the building is saved much trouble and unnecessary expense.

Where the scheme is large enough to justify the cost, a passenger lift is undoubtedly a big advantage, in the case of a building with three or more floors ; but unless the flats are 15 or more in number, it does not as a rule pay an owner to install one. The cost of a "push-button" lift to carry four people is today about £700 plus builder's work in connection with it. This latter is not usually a large item where a lift well-hole existing in a building can be utilised for the purpose. The annual cost of Insurance, current, lift-maintenance and repairs approximates to £35 per annum for a small lift serving four floors.

With regard to the fittings and labour-saving devices installed in a converted flat, it is not good policy to economise unduly in the cost of these. It should be borne in mind that, although under today's abnormal conditions it is easy to let any small flat however poorly designed and equipped, the scarcity of accommodation will sooner or later be less acute, and the letting of a property will then, to a large extent, depend upon its attractive design and convenience, coupled with a competitive rental.

Another worth-while improvement which, although adding somewhat to the cost, is of considerable benefit to the comfort of the occupiers, is the pugging of floors and the utilisation of sound-insulating partitions in the dividing-up of the newly-formed rooms in order to prevent, as far as possible, the inter-transmission of sound.

In the case of the larger conversions, in London and a few of the larger towns, provision has to be made for means of escape in case of fire. These provisions are likely, before long, to be made compulsory throughout the country.

The scope for attractive and profitable conversions is a wide one, and is not confined only to the alteration of large and out-of-date residential properties. A discriminating investor will find other types of buildings which, by skilful replanning, may be converted at a not unreasonable cost.

Although the majority of flat-conversions have been, and will continue to be, carried out in the vicinity of the large towns, opportunities also offer themselves in some outlying districts. For instance, in many popular seaside resorts there stand today

large derelict buildings of four or more storeys, erstwhile private residential hotels, grievously neglected and war-scarred, which doubtless will never again be restored to their pre-war use. Some of these could well be converted into self-contained flats of a medium class; indeed quite a number of such transformations have already been undertaken with considerable success.

With the post-war growth of frequent fast train-services, and the re-establishment of the motor-coach network throughout the country, a rapid expansion of the demand for residential flats in health giving surroundings, and within easy reach of the large industrial centres, may be expected with confidence. In all cases, however, the would-be investor should be careful not to be led away by the glowing possibilities, and induced to pay fancy prices for buildings which, in some cases and not so very long ago, could be described as "white elephants."

It may be found in some instances that the ground-floor of a large building is not easily adaptable, principally owing to the height of the rooms or the lack of natural lighting to the rear portions of the building. In such cases it may be worth while to consider whether the ground-floor can be converted into lock-up shops, provided the situation appears to warrant such an alteration, and that Town Planning and other matters do not prohibit the change of user.

At the other end of the scale, there are the modest alterations carried out to the small, two storey villa-type house, forming two self-contained flats, each letting at inclusive rents of from £1 to £1 10s. per week. For this type the alterations are generally slight, involving little more than a reconstruction of part of the staircase (to cut off the ground-floor flat and provide a separate entrance to the upper one), an additional bathroom and W.C., and the necessary alterations to plumbing, gas and electric services. The costs of such conversions are usually low, £100 to £150 per flat being a good average, and the return on capital is higher as a rule than in the class of conversions referred to earlier in this article. Six to seven per cent may be taken as normal. Very many such conversions were carried out by both large and small investors before the war. But since the end of the war this class of reconstruction has been executed almost entirely by the Local Authorities; although provided the necessary Licence is obtained, and labour is available, there is no reason why private enterprise should not participate.

# SOUND INSULATION

D. M. J. DAVIDSON, A.R.T.C.



MUCH has been written on the subject of sound insulation, and a great deal of experimental work has been carried out to determine the resistance to the transmission of sound of various forms of wall and floor construction. But valuable as this information is, it is no easy matter to apply it to the conversion of houses into flats, where drastic alterations to the structure or plan of the building cannot readily be made. But certain improvements can be effected without great expenditure for labour and materials, when the problem should be tackled in three ways :

1. The reduction or elimination of noise at its source.
2. Planning against noise.
3. The use of sound-insulating materials and construction.

## REDUCTION OF NOISE AT SOURCE

This is the most effective, and usually the least expensive, method of combating the nuisance of noise. Many of the more troublesome noises can be dealt with in this way, particularly those associated with plumbing and heating services. Water-hammer in pipes can be prevented by the avoidance of sharp bends and rapid reductions in pipe-diameter, and the use of good quality fittings. Taps should have fixed jumpers with properly-sized washers, and badly-worn fittings should be replaced wherever possible. W.C. suites should preferably be of the low-down type (these being more silent in action) with a lid over the seat. A properly designed suite with syphonic action is almost inaudible outside the compartment. The lavatory-cistern should be supplied from a storage-tank rather than from mains, but where this is not possible the mains-pressure should be throttled down at the nearest stop-cock. Ball-valves should be fitted with silencers, consisting of a short length of pipe reaching almost to the bottom of the cistern. Silencers should also be fitted to the ball-valves in storage cisterns, as the noise created by the constant filling of these can be most troublesome to the tenants of upper flats. The gurgling noise caused by most waste-fittings can be prevented by the use of anti-vacuum type traps.

The banging of doors is an unnecessary source of noise. The fitting of rubber buffers effects an improvement, but the use of an automatic door-closer, of which there are quite inexpensive types, in conjunction with a well-made lock, will silence almost any door. These precautions are more necessary with light, single-panelled or hollow-flush doors than with those of heavier construction found in older property. Ball-catches on cupboard doors should be avoided, and more silent types used, such as the push-button catch. On sliding doors, fibre-runners and tracks are quieter than the ball-bearing type.

The noise of footsteps can be reduced by the provision of a resilient flooring such as cork, rubber or fitted carpet. Floor-coverings are often left for the tenant to provide, but

the use of hard, resonant surfaces, such as parquet, tiles or granolithic, should be avoided. Electric fittings can also be improved. There is a need for silent-acting switches, the average flush-fitting switch, with plastic or metal plate being unnecessarily noisy. There is also a need for more silent motive parts, as in vacuum cleaners and refrigerators. Most of these noises are structure-borne, and it is only by reduction at their source that they can be prevented from being transmitted through walls and floors.

#### PLANNING AGAINST NOISE

In new buildings it is usually possible to plan the accommodation so that "quiet" rooms are grouped together, with living-rooms placed on outer and not on party-walls. But in dealing with existing property the size and location of rooms may determine their usage. Even so, if the problem of sound-nuisance is kept to the forefront, minor alterations in plan may be made which will mitigate the nuisance. The separation of bedrooms from living-rooms by entrance-hall, cupboards or bathroom; the use of fitted clothes-cupboards between bedrooms, which act as sound insulators; the placing of W.C. cisterns on outer and not on party-walls; the provision of electric points in positions which encourage the siting of radios or radiograms away from party walls—these are some examples of this form of planning.

#### SOUND INSULATION MATERIALS

In addition to the above, it may be necessary to improve the insulation-value of existing floors or partitions, or to decide on a type of construction, for partitions, helpful to this end. Floors present the greatest problem, as they form the only barrier against airborne sound such as conversation and radio, and structure-borne sound such as footsteps. The existing construction may consist of timber-joists with lath and plaster ceiling, and tongued and grooved flooring with no infilling or pugging. The introduction of any light-weight filling will make little difference to the insulation-value, as the floor lacks mass. But where the floor boards can be lifted or require replacement, a suitable infilling can be introduced by nailing wood fillets to the side of the joists, laying loose boards across, and inserting a layer of 2 in. sand or 4 in. coke-breeze or clinker. The effect of this infilling will be greatly reduced if the space between end-joists and walls is left unfilled.

An alternative or additional measure is the use of a false ceiling, which may also improve the proportions of smaller rooms. This should be quite independent of the floor, and may be lined with insulating board or wood-wool slab, with plaster finish. The introduction of glass-silk, slag-wool or eel-grass quilting will also increase the overall insulation against airborne sound.

Where the existing floor is of solid concrete or hollow tile, its insulation against airborne sound may be considered adequate; but it will be necessary to provide a resilient floor-covering, or a "floating floor", to prevent the transmission of impact-sounds such as footsteps. "Floating floors" may be of proprietary types, or may consist of a heavy quilt or matting over which the new floor-surface is laid. In either case, the floor-level will be raised by 3 in. to 4 in., a factor which may preclude their use in conversion work.

Partitions and party-walls present another problem. Party-walls of 9 in. or 14 in.

brickwork provide reasonable insulation against airborne sound, and there is little that can be done to improve their insulation. For internal partitions,  $4\frac{1}{2}$  in. brick plastered both sides provides adequate insulation, and such construction can hardly be bettered. For new partitions, which have to be carried on wood-joist floors, this form of construction is not possible because of its weight. Single leaf, lightweight partitions of any form will have a lower insulation value, and it is only by the use of double partitions that an equivalent or higher degree of insulation can be obtained. These are more costly and occupy a larger floor area, and it is more economical to equip such cavities as cupboards between rooms. The lining of the cavity with insulation-quilts will increase the insulation, but the most important point is to avoid gaps or cracks in the structure. The efficiency of a wall or floor is a measure of the insulation-value at its weakest point. For this reason special care must be taken with doors and other openings; lavatory-doors and doors leading to a common landing should be tight-fitting and have thresholds; they should also be of heavy construction.

Wireless-noise cannot be controlled entirely at its source, but its conduction along floors may be reduced by placing the receiver on a resilient pad of felt, cork or sponge rubber. In property overlooking a busy street, traffic-noises may be troublesome. These can be reduced to some extent by the provision of an acoustically-absorbent ceiling, which prevents the reflection of the noise into the body of the room. Double windows will provide added protection, but only so long as they are kept closed. This is not always possible except in air-conditioned buildings, or where a special air-filter fitted with sound-deadening baffles is used.

It will be seen from these observations that there is no sound-insulating medium which can be effectively applied to any surface to reduce or eliminate the passage of sound. The statement that a material has a sound-absorption factor of 80% or 90% is often misinterpreted. Sound-absorption is not sound-insulation, but merely a measure of the reflective value of a surface. It often follows that the more absorbent the surface of a wall or ceiling the less is its resistance to the passage of sound.

In new construction much can be done to alleviate the nuisance of noise, both by planning and by the adoption of constructional methods based on the results of research into this subject. But in dealing with existing property the most hopeful approach is by the reduction or elimination of noise at its source.

# HEAT SERVICES IN FLAT CONVERSION

LESLIE HARDERN



IN considering the conversion of houses into flats, the provision of adequate heat services for cooking, heating, water heating, refrigeration, washing and drying, is of paramount importance to both landlord and tenant. Broadly speaking, conversions may be carried out in three ways—

1. By carrying the gas and electric services to the flats and leaving it to the tenants to provide their own appliances for fixing to the points.
2. By providing both the gas and electric services and the appliances in which they are going to be used.
3. By providing the gas and electric services, the appliances, and part or all of the fuel.

The first way involves the owner in the least outlay and trouble. It also suits those tenants who have already purchased cookers, fires and refrigerators. Many tenants, too, like to choose the kinds of appliances which suit them best.

The second way, however, is steadily gaining ground. It is felt that just as the owner provides a bath and wash basin, so he should provide appliances like cookers, fires, water heaters and refrigerators. The tenants can thus take possession without having to wait while gas, electric or plumbing work is being completed.

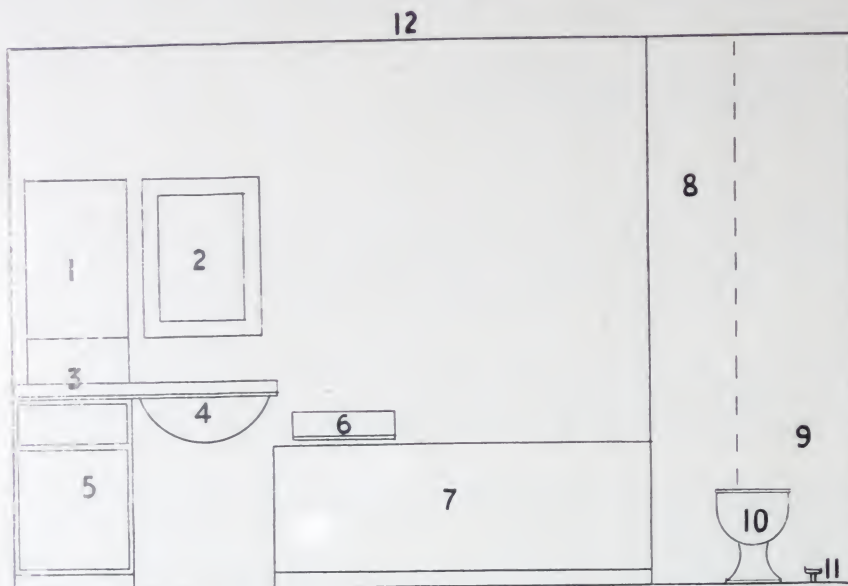
The third way is still in its early stages. It can take the form of central hot water alone, or in conjunction with part or total central heating. A fixed charge, representing the average cost of providing the service, is included in the rent. The main objection to this system is raised by careful tenants, who have to pay more than they otherwise would to compensate for other tenants who are wasteful.

It is obviously desirable that full advantage shall be taken of smokeless fuels in all future conversion work. This will mean a saving to the owner in lower costs of decoration and maintenance, and to the tenant in reduction of cleaning and housework and chimney-sweeping. Gas and electric appliances are, of course, entirely smokeless; and, thanks to recent development work, it is now possible to obtain completely smokeless gas-ignited coke fires. These are made in clean vitreous enamel, are highly efficient, and can be regulated almost like gas fires.

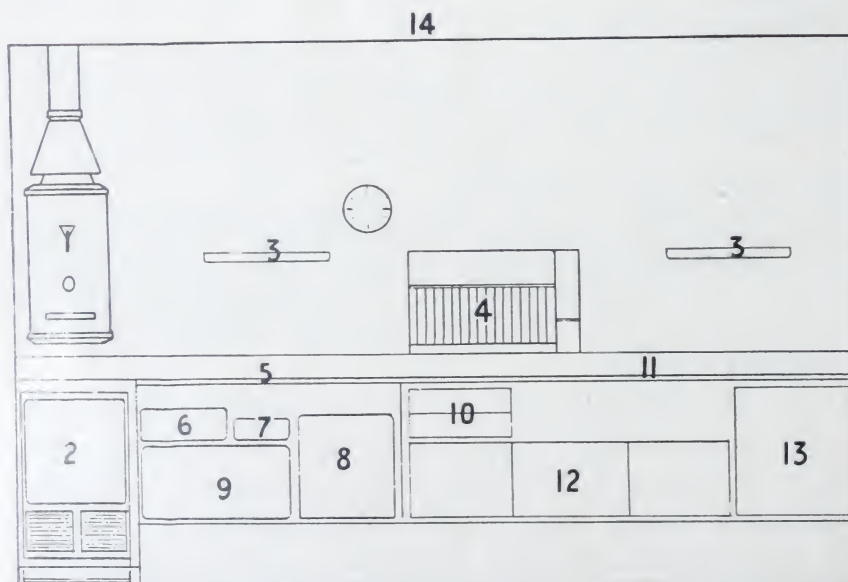
It is quite clear from the various reports prepared by government committees, professional bodies and women's organisations during the last few years that the greatest need in all future conversion work is an ample supply of hot water for the housewife.

## PLAN OF KITCHEN-BATHROOM UNIT

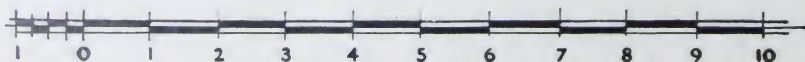
*which would divide a large room into kitchen and bathroom*



- 1 Built-in Bathroom Cabinet
- 2 Adjustable Mirror with concealed lighting
- 3 Recess
- 4 Wash Basin, towel rail under
- 5 Cupboard for soiled linen
- 6 Recessed Tray for soap and brushes
- 7 Bath
- 8 Pipe Duct in wall, with access panel
- 9 W.C. Tank in wall
- 10 W.C.
- 11 Foot Pedal Flush for W.C.
- 12 Factory-made Aluminium Wall Cork lined



- 1 Ascot Multipoint Gas Water Heater
- 2 Gas Refrigerator with foot pedal to open
- 3 Electric Light
- 4 Rack for plates and cups and Tray for soap and cleaning materials
- 5 Hotplate
- 6 Hotcloset
- 7 Grill
- 8 Oven
- 9 Drawer for saucepans
- 10 Drawers
- 11 Stainless Steel Double Sink
- 12 Cupboard with sliding doors
- 13 Pull-out Cupboard
- 14 Factory-made Aluminium Wall Cork lined



In a recent paper, "The Technical Aspects of the Gas Industry's Contribution to Post-War Housing," presented to the Institution of Gas Engineers, Watson House experts gave a number of hot-water figures which are worthy of careful study.

The following tables from the paper, which are based on laboratory experiment and household practice, show how the weekly hot-water load is allocated in a normal household.

There will be great variations in practice in these quantities, as habits differ in every family.

TABLE 1 . LOWER STANDARD USE

PURPOSE	Times a week	Quantity drawn at one time. Usable temperature (gallons)	Gallons at usable temperature
1 Small wash up	56	1	56
2 Washing up	21	1	21
3 In sink or bucket for house cleaning or incidental use	7	4	28
4 Child's bath, 5 in. to 6 in. depth	4	15	60
5 Adult's bath, 7 in. to 8½ in. depth	2	24	48
6 Laundry boiling	2	5	10
TOTAL 223			

TABLE 2 . HIGHER STANDARD USE

PURPOSE	Times a week	Quantity drawn at one time. Usable temperature (gallons)	Gallons at usable temperature
1 Small wash up	56	$\frac{3}{4}$	42
2 Washing up	42	$1\frac{1}{3}$	56
3 In sink or bucket for house cleaning or incidental use	7	5	35
4 } Baths	8	24	192
5 }			
6 Laundry boiling	2	5	10
7 Additional small quantities, making generous allowances of small amounts and baths	42	$\frac{1}{2}$	21
TOTAL 356			

The expression "usable temperature" means the suitable temperature for the particular job for which the water is used.

Most of the water is used at a temperature of 110 deg. F. to 120 deg. F. for wash basin or bath. For washing-up at the sink the water must be 140 deg. F. to remove grease and fats satisfactorily. For other purposes at the sink, a temperature between 130 deg. F. and 140 deg. F. is sufficient.

The lower standard deals with the use of 160 gallons of water at 140 deg. F. It would obviously not be possible to relate accurately gallons delivered at 140 deg. F. to gallons at usable temperature, because of the variable factors involved in any hot water load.

The higher standard is recommended in the Report on the Heating and Ventilation of Dwellings (Post-War Building No. 19), where it is stated that an installation should be capable of supplying 250 gallons of hot water at 140 deg. F. for all normal household purposes for a family of two adults and two children.

It will be noted that baths are not allowed on any generous scale, although it is likely that persons employed in trades that are normally "dirty"—coalmen, dustmen, miners, and so on—may require baths daily.

The washing-up figure, 21 times a week in the first table, gives a total of three washes a day after three meals, because in normal families at least three meals of some kind are eaten daily in the home. In the second table the corresponding figure is not minimal as in Table 1, for the quantity of washing-up water is doubled. In everyday practice this is generally correct—particularly in families that, for a variety of reasons, have to eat irregularly. The need for a constant supply of hot water here is very obvious. In each case the quantity is that normally drawn in a washing-up bowl or a small sink. Really hot water is used in the sink, but in baths and hand basins it is usual for warm, and not hot water, to be used. The size of the sink always has an important bearing on the quantity drawn, and the standardised sink will help to regulate hot water in dish-washing. Even the lower standard is a marked advance on pre-war standards, and recognises the need for more hot water for each household.

This surprising variety of intermittent use can be met by the wide range of gas appliances available; single-point and multi-point water heaters, of both instantaneous and storage type, circulators, and central-heating units.

One favourite method, particularly where the owner is meeting with building and plumbing difficulties, is to install an instantaneous gas water heater in the bathroom serving the bath and wash-basin, and a small instantaneous water heater at the sink. In other cases it may be preferable to install a multi-point gas water heater which will supply both culinary and bath needs, but short runs for the hot water pipes are essential.

Many gas undertakings are prepared to hire gas water heaters for reasonable rentals, including servicing, thus relieving owners of this responsibility, and where such annual charges occur they may be claimed as a tax relief.



(Fig. 1) The Cabinet High Beam Gas Fire      Photograph from 'Design at Home Exhibition' C.E.M.A.



(Fig. 2) Gas Cooker with hotplate separated from the oven

Where the hot water supply is included in the rent of the flat, it may be possible for arrangements to be made for this service to be obtained from gas water heaters, supplied through master meters at special bulk prices for gas. In considering such cases, however, it must be remembered that when the cost of hot water is included in the rent, consumption is usually greater than when tenants pay direct to the gas company or by cash placed in the meter. It is interesting to see the figures of two experimental installations in the London area.

In one block of flats, where gas central boilers were installed for 50 flats, the average gas consumption for nine years was approximately 300 therms per flat per annum ; whereas in a block of somewhat similar flats using multi-point gas water heaters, supplied through master meters, the gas consumption was 200 therms per annum. In the first block it is not possible to say what additional gas was used for cooking, but in the paper quoted earlier it is postulated that full cooking for a family of four persons amounts to about 80 therms a year.

In the second block where instantaneous heaters were used, the water load consumed 200 therms of gas for each flat for all hot water purposes, which is a remarkably low consumption. Even at the flat rate price of gas, at 1s. 2d. a therm, it represents an expenditure of only 4s. 6d. a week on hot water. This cost would be correspondingly lower where the price per therm is less than 1s. 2d. These consumers, as was pointed out, paid an all in rental that covered the cost of their hot water. Doubtless the small average consumption was due, in part, to economical tenants, but it was due also to the efficient performance of the instantaneous heaters in shutting off the gas when water ceased to be drawn.

The flats were of the higher artisan (or lower middle-class) type, letting at an annual rental of £110, and an expenditure on 80 therms of gas for cooking gives a very low overall fuel cost indeed for the year.

Psychology also plays a part here, for when one turns a hot tap from a central boiler one thinks only of the hot water that gushes out. On the other hand, if an automatic gas water heater is installed one gets hot water and at the same time a picture of gas burning in the appliance. That appliance is part of the economy of the home and there is a subtle—almost subconscious—urge not to waste fuel.

It is extremely difficult to get figures based on bathing habits, but it is well known that people in the higher income groups bath much more frequently than those in the lower groups. In the latter, one bath night a week seems to be the rule—a rule which is largely due to a want of facilities. Better facilities and cheaper hot water should lead to more bath-nights—and probably better health.

Although cooking habits vary almost as widely as hot water habits, the choice and installation of a suitable cooker are simpler than with water heaters. There is a wide range of modern easily-cleaned vitreous enamelled cookers available, usually with thermostatic oven-control. One small model, the Cabinet (Fig. 1), contains both an oven and a fire, and is ideal for the bachelor flat. Many models can be built-in or free standing, according to need. Others are now made so that the hotplate can be separated from the oven, thus giving much greater flexibility in conversions (Fig. 2). Some of the latest



(Fig. 3) Vek type Gas Radiator



(Fig. 5) Wall type Gas Fire

models have silent "neat gas" burners, newly-designed improved grillers and folding plate-racks.

Heating can be provided in three ways :—

1. Completely from a central source.
2. Partly from a central source (background heating), topped-up by local heaters.
3. By local heaters.

Where heating is provided completely or partly from a central source, coke or gas-fired plant can be installed. Gravity-fed coke-plant is economical to run, and can be thermostatically controlled, but requires filling and cleaning. Gas-fired plant can be entirely controlled by clock and thermostat to operate at predetermined times and temperatures without any attention.

Another method of background heating is to fix small gas wall-radiators of the Vek type (Fig. 3) in rooms, corridors and halls. These will burn continuously with a small gas consumption, thus keeping the house warm and dry.

For topping-up purposes, and for local heating, there is an extensive range of fixed and portable fires, which will provide the right answer to every conversion problem.

Modern fixed gas fires are available in beautiful designs, with a wide range of colours to match their surroundings. The latest models incorporate the "neat gas" burners (which are entirely silent and cannot light back) and sturdier radiants. Both hearth-type (Fig. 4) and wall-type (Fig. 5) are in production.

Portable fires, which are highly efficient, as they combine radiant and convective heating, can be plugged in to convenient points. Some of the modern fixed fires also combine radiation and convection, the warm air issuing from louvres above the radiant section.



(Fig. 4) Hearth type Gas Fire



(Fig. 6) Fulham Grate. Gas-ignited Coke Fire

In living-rooms, where so many people still prefer open fires using solid fuel, it is now possible to install the new gas-ignited coke fires (Fig. 6), which are not only smokeless, but are finished in coloured vitreous enamel, and can be regulated almost like gas fires.

Refrigeration was becoming popular before the war, and the result of wartime experience is leading to greatly increased demand. Owners of houses which are being converted should try to provide one of the latest refrigerators, which can either be supplied as free-standing units or for building-in (Figs. 8 and 9). A great advantage of gas-refrigerators, particularly in flats, is that they have no moving parts, and are therefore completely noiseless.

The report entitled "Heating and Ventilation of Dwellings," by the Heating and Ventilation (Reconstruction) Committee (Post-War Building Studies No. 19), showed that a very large proportion of the population in this country does all its own laundry—and that most people do some laundering of particular items of clothing.

Clothes can be washed in wash coppers, washing machines, or heated sinks. Wash coppers can be supplied with flexible connections, for plugging-in to a convenient gas point, or can be fixed rigidly, with a connection to the sink waste-pipe. Washing machines can be heated by gas, with either hand or electric agitator of the clothes. A new arrival is the heated sink, which saves space by washing the clothes as well as the dishes. The heat is provided by a series of gas flames fitted below the sink.

It is not sufficient to provide for washing only. Drying is often a problem.

On wet days the clothes have to be



(Fig. 7) Gas Drying Cabinet

draped round the living-room fire, or in some such inconvenient spot. The provision of a gas drying-cabinet means that the housewife is independent of the weather, of smuts, and of indoor inconvenience (Fig. 7).

In most conversions it will be found easiest to use individual units, either of free standing or built-in types, as they afford the greatest flexibility in planning (Fig. 8). This will be progressively easier, as most manufacturers are working to British Standard Specification. In a number of cases, however, where there is sufficient free wall-space, it is possible to make use of one of the new package-kitchens (Fig. 9), in which are combined cooker, refrigerator, water heater, sink, plate-racks and cupboards. Such package-kitchens are made in either aluminium or vitreous enamelled pressed-steel.



(Fig. 8) Kitchen planned with individual units



(Fig. 9) Package kitchen fitted with Gas Cooker, Gas Refrigerator and Sink Gas Water Heater

# PLUMBING FOR CONVERSION WORK

W. J. WOOLGAR, M.R.San.I., A.M.I.S.E., M.I.P., R.P.



THE conversion of existing buildings, medium and large dwelling houses, tenements, etc., consists not only in providing extra accommodation but also in providing facilities suitable for family units. This entails the provision of extra kitchens and bathrooms containing at least the minimum number of appliances and fittings required by modern living standards. The additional plumbing may consequently involve a lot of pipework, often complicated in design, where the space to be divided, and the sanitary appliances to be served, do not allow of simplified plumbing. There have been, however, too many cases of bad, haphazard plumbing in conversion work, a tangle of unsightly pipework, inefficient in function and difficult to keep free from dirt, or so placed as to be inaccessible.

To achieve good and economic plumbing, the architect is well advised to make a preliminary survey of the job in collaboration with an experienced plumbing contractor. The plumbing contractor, or his qualified representative, will be able to assist the architect in assessing the suitability of the existing supply and distribution piping, and soil and waste piping, for incorporation in the new system, and enable him to take an early decision as to how far he should allow it to affect his planning. In the preliminary survey, information should also be obtained as to the adequacy of the existing water-supply. The plumbing contractor should be one who is familiar with local conditions, and with requirements as regards plumbing design.

## GENERAL DESIGN PRINCIPLES FOR PLUMBING

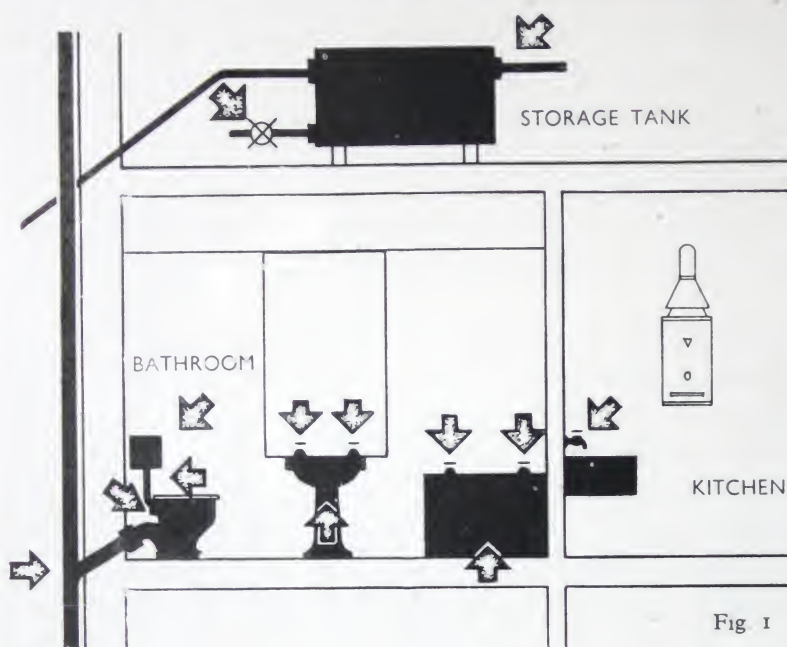
In conversion-work it may not be possible to adhere to design to the same degree as in new work, since clearly the architect must place emphasis on obtaining the best re-allocation of space with minimum structural alteration. However, the basic principle of ensuring efficient plumbing and a hygienic standard conforming with local bye-laws must be observed. Primary factors that must be given full and careful consideration are :

- |                                  |                                 |
|----------------------------------|---------------------------------|
| (a) access for maintenance       | (d) reduction of noise nuisance |
| (b) concealment of pipes         | (e) anti-frost precautions      |
| (c) close grouping of appliances |                                 |

Reasonably accessible pipe-runs are a particular advantage in buildings divided up into separate dwellings. The sanitary plumbing will be common to all family-units and, as the usual practice is for stacks to be run externally, accessibility is readily achieved. If, however, stacks are to be run internally in a duct, it is clearly preferable that access to the duct should be from a common staircase, or similar shaft, to avoid disturbing the occupants of the apartments when repair and maintenance work is carried out.

Close grouping of sanitary appliances and the proximity of kitchens and bathrooms must materially assist in obtaining satisfactory and economical plumbing, since long branches, both for disposal and distribution piping, are thus avoided. Concealment, with reasonable accessibility, can usually be found for short branches of internal pipework behind appliances and fitments.

The noisy operation of sanitary appliances can be especially unpleasant in converted premises, where the standard of sound insulation which can be economically achieved is likely to be low. Much can be done to decrease annoyance by the use of appliances and fittings of a type and quality which will remain quiet in operation. Common sources of noise in plumbing systems are indicated in Fig. 1.



Silencer-pipes fitted on ball-valves, the bottoms of which are curved to a slow right-angle bend so that the water does not impinge directly on to the flush-tank or supply-cistern, are a satisfactory means of overcoming the noise of water rushing in when the cisterns are being filled. It is necessary to drill a small hole in the silencer-pipe above the normal water-level to avoid syphonage. Various methods are available whereby the hissing noise that frequently occurs on ball valves, particularly at the later period of filling, can be

avoided. The introduction of fine mesh copper-gauze at the back of the ball-valve is one particular method ; another recommended method is the insertion, in the tailpiece of the ball-valve unit, of fine copper-wire compressed into the form of a plug.

Where several floors are supplied from a common storage-cistern in the roof or top storey, some consideration should be given to the size of the orifice of the ball-valve to the fittings at each level, since, if the same orifice is used at each floor-level, the greater pressure available at the lower floors may result in excessive noise. As a guide, the orifice of the ball valves should be regulated as given in the following table :

Under 7 ft. head	$\frac{3}{8}$ in. orifice
From 7 ft. to 30 ft. head	$\frac{1}{4}$ in. „
From 30 ft to 70 ft. head	$\frac{5}{16}$ in. „

In the past, attention to the choice of pipe-routes in which distribution-piping is not vulnerable to freezing has often been neglected. Vulnerable points in a structure are readily recognised, and insulation of pipes at these points, to reduce the risk of recurring failure in

every cold period, should be looked upon as a necessity rather than as an extra cost to be avoided. It is advantageous if the water distributing pipes can be shut off within each apartment they serve, and emptied during periods of non-occupancy.

It is appreciated that, in conversion work, each job has peculiarities, making it more difficult to incorporate all principles of plumbing design than would be the case for new work. Due weight, however, should be given to those principles which, apart from producing a hygienic and efficient system, create and maintain privacy in each apartment.

#### SUPPLY AND DISTRIBUTION

The conversion of a large dwelling-house into several apartments greatly increases the demand for water. It is therefore of first importance to examine the existing supply, and increase it, if necessary, to meet the larger requirements.

The three normal systems of cold water-supply are :

- (1) Where all appliances are fed direct from the main water-supply without any separate storage within the building.
- (2) Where some appliances are fed direct from the main and some from a cistern within the building. (For example, where it is essential that one tap over the sink should be supplied direct from the main.)
- (3) Where all appliances are fed from a cistern.

The choice of system is primarily guided by what is permitted by the local water-supply authorities. It is clear that where the water-authority will not permit a general " direct from the main " system, space must in most cases be found for considerably increased storage. Irrespective of the cold water-supply system, if solid fuel-burning appliances are used for the hot water-system (such as independent or back boilers) some provision for cistern-stored cold water is required for each water-heating appliance.

While instantaneous water-heating appliances need not necessarily be fed from a cistern, it is nevertheless important that the cold supply to them be constant. It is often a failing in conversion work that, where more than one heater is put in operation at the same time, the cold supply is reduced to such an extent that the automatic valve of the heater becomes erratic in action, causing intermittent supply of hot water. Irrespective of the system employed for supplying cold water, it is essential to ensure that the existing supply should be increased, if necessary, to meet the considerably greater demands in the converted property. A figure upon which to base requirements can be taken as 25 to 30 gallons per person per day.

A convenient guide to the number of branches of a given size that can be supplied by a delivery-pipe is given overleaf, together with the size of delivery-pipe necessary to supply a given number of branches. It is based on the fact that the discharging powers of pipes vary as the square roots of the fifth powers of their diameters. In working out the table, quantities greater than one-half have been given as one.

Modern living-standards demand that an ample supply of hot water is available at any time to meet domestic needs. Efficient hot water-supply systems are more economical to install, and cheaper to run, where the appliances served by the water-heater or storage-

RELATIVE DISCHARGING POWERS OF PIPES						
		Diameter of BRANCH PIPE, in Inches				
		$1\frac{1}{2}$	$1\frac{1}{4}$	1	$\frac{3}{4}$	$\frac{1}{2}$
Diameter of Delivery Pipe in inches	$1\frac{1}{2}$	1	2	3	6	16
	$1\frac{1}{4}$		1	2	4	10
	1			1	2	6
	$\frac{3}{4}$				1	3
	$\frac{1}{2}$					1
		Number of Branch Pipes.				

cistern are closely grouped, thus reducing pipe-runs and, consequently, heat-loss. The elimination of the hot water-storage cistern where instantaneous gas water-heaters are used simplifies the problem of close grouping considerably.

#### SANITARY PLUMBING

For conversion-work in which sanitary appliances are being introduced on several floors, a large portion of the extra pipe-work will be required for ventilating purposes, if the bye-laws at present extant are to be met. Much interest is being shown in the possible application of deep seal-traps to appliances with unvented branches, and experiments are being made to determine design principles and limitations of this system. Where local authorities have satisfied themselves that the system can be used satisfactorily for a given set of circumstances, agreement may be forthcoming for its use. At the moment, general acceptance of the system, with covering regulations, is not confirmed.

Experiments have been carried out to determine satisfactory one-pipe plumbing systems, and the result of these experiments is published in Post-War Building Study No. 4, "Plumbing," published by H.M. Stationery Office, for the Ministry of Works. These experiments give a clear indication that one-pipe systems of plumbing with modified ventilation, when installed to certain standards, can be quite satisfactory.

#### SELECTION OF APPLIANCES AND FITTINGS

There has inevitably been some shortage of the various appliances required in conversion work. The architect is denied to some extent the opportunity to choose from a wide range of style, quality and finish. Now that British Standards are being more widely used, it will follow that the greater bulk of supplies available will conform to those standards, and it will therefore be necessary to design kitchen and bathroom units with standard fittings, rather than with unusual fittings which would suit a particular planning arrangement but could not be considered entirely suitable for general use.

Mention has already been made of the desirability of choosing sanitary fittings that are silent in operation, and in this respect the use of ventilated silencer-pipes on ball-valves in both flushing-tanks and supply-systems is well worth while. A flap to the seat of the w.c.

fitting may be considered in some cases a luxury, but in small combined bathrooms and w.c.'s it will afford, when closed, not only a measure of sound-control but will also serve as a small table or seat.

#### CHOICE OF MATERIALS

The choice of materials for the various piping-systems should be determined by suitability of purpose. For both hot and cold water-systems the materials used must conform to the requirements of the local water-supply authorities, which are always based on the characteristics of the local water-supply.

Economy in plumbing-costs can be achieved if careful consideration is given to the particular requirements of the work in hand. It will be obvious that, where the appliances are closely grouped and there is little room for large radius-bends, it is better to use a piping material that can be readily adapted to suit the particular circumstances, rather than a material that will require special or purpose-made fittings. Where pipes are exposed, the question of neatness and easy fixing must be considered.

#### WASTE AND SOIL PIPES

As a rule, main vertical stacks can be most readily arranged in cast iron, but for the several branches and short connections to fittings full advantage should be taken of materials that are easy to prepare and install. Traps beneath the fittings, apart from the w.c., should be of the type that can be disconnected from both the fitting and the pipe, for cleaning or any other attention that may be required; and provision should be made so that the trap is readily accessible where the underside of sinks, wash-hand basins, or baths is completely enclosed, with cupboards or otherwise.

The minimum size of waste and soil-pipes is laid down in the Ministry of Health Model Byelaws, on which the requirements of Local Authorities are based. Recommendations for pipe-sizes for both "One-pipe" and "Combined System" plumbing-arrangements are made in a very useful publication by the Institute of Plumbers, "Minimum Specifications, No. 1." The American method of arriving at the sizes of soil and waste-pipes is based on research on the discharge from sanitary fittings. The work was carried out by the Bureau of Standards of the U.S. Department of Commerce and the results published in their "Recommended Minimum Requirements for Plumbing." The discharge from a lavatory-basin with a  $1\frac{1}{4}$  in. outlet is taken as one unit, approximately 1 cu. ft. of water per minute, and named a "fixture unit." The following tables give a comparison of discharges :

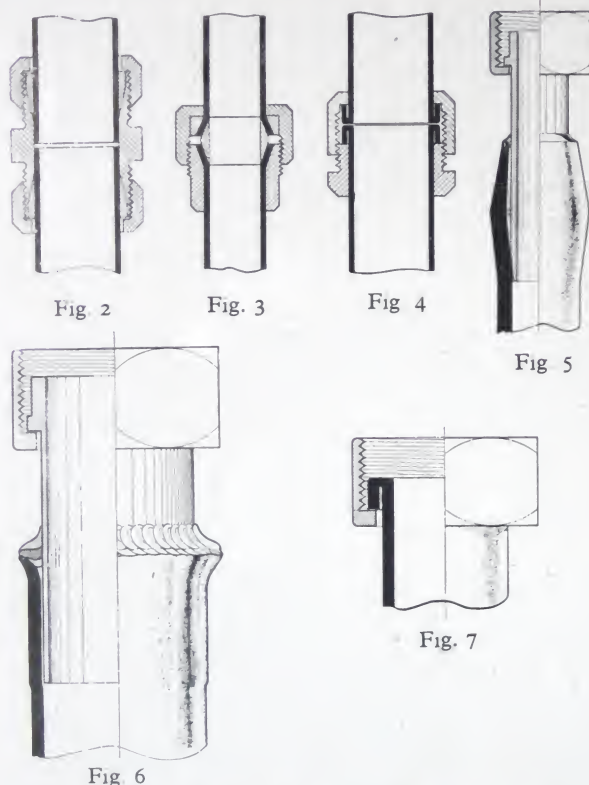
Fitting	Min Diam. Waste in.	Fixture Units
1 Lavatory basin	$1\frac{1}{4}$	1
1 Sink	$1\frac{1}{2}$	$1\frac{1}{2}$
1 Bath	$1\frac{1}{2}$	2
1 W.C.	3	6

Provision must be made, however, for the intermittent discharge from fittings since rarely will all fittings be used simultaneously. By trial and observation the opposite table was determined :

Maximum number of units that can be discharged into one stack having 45° Y inlets		
Diam. of Stack in.	In one Branch Interval 8 ft. min.	In whole Stack
$1\frac{1}{2}$	4	12
2	15	36
3	45	72
4	240	384

It will be seen from the above that the generally accepted sizes of waste and soil-pipes are adequate to deal with the waste from a large number of fittings. Notice must, in any case, be taken of the requirements of the Local Authority, since the Sanitary Inspector or his authorised deputy must approve the system before the apartments can be occupied.

Gas supply-pipes are generally in wrought iron-tube, but where neatness of appearance is a first consideration the use of thin-walled rigid piping can be adopted without greatly increasing the installation-costs. Short connections to gas-meters or other gas-appliances can frequently be best effected in one of the flexible piping-materials.



## JOINTS

Any plumbing-system will, of course, require the use of a considerable number of joints, and some typical jointing-methods are illustrated for copper and lead-pipe. The standard method of jointing wrought iron, whether plain or galvanised, is of course with a standard Whitworth gas-thread and screwed fittings, which are obtainable in a range to suit almost any requirements. In addition to the joints illustrated for copper (Figs. 2, 3 and 4) there are available the solder capillary fittings and bronze welding direct on the tube, and for lead pipes, the traditional wiped plumber's joint for both running and branch-joints. The two alternative methods illustrated, namely the Staern (Fig. 5) and the leadburned joint (Fig. 6) have particular advantages in economy ; and the third example (Fig. 7) shows the

method of using the Pyrene Patent Tooled Joint for connecting lead-pipe to gas-meters, which eliminates the use of solder. Before any particular joint is chosen reference should be made to the local water-supply authority to ensure that the type preferred is acceptable to them.

A great deal of valuable information, on the advantages of the different piping-materials and methods of installation, has been published by the various development organisations ; and this information, allied to the experience of the skilled plumber, will ensure that the materials in every case are used to the best advantage.

## NOTES ON TYPICAL EXAMPLES

### *A Scheme for the Conversion of Detached Two-Storey Suburban Villa* (see pages 123-128)

This is an example of the conversion of a medium-sized house into two self-contained flats, in which full advantage has been taken of existing plumbing-arrangements. It will be noted that the only extension of water-service required is to the ground-floor bath-

room, the other groups of appliances being already served by existing pipe-work. The use of Ascot Multi-Point water-heaters provides a plentiful supply of hot water, with the apparatus placed in such a position that the pipe-runs are reduced to an absolute minimum, whilst affording completely separate control. The provision of the disposal system to pick up the ground-floor w.c. does not require extensive alteration.

*A Scheme for the Conversion of Tenements* (see pages 136-146)

Tenements. This example, which substitutes a much higher standard of domestic and sanitary equipment, can be regarded as an extensive alteration. The standard of equipment is so improved that it is necessary to provide completely new supply, soil and waste services. The arrangement does, however, lend itself admirably to the economical type of piping-layout for back-to-back units, with the main stacks run in a vertical duct, a typical example of which is shown in Fig. 8.

In this example it is obvious that the introduction of a back boiler in the living-room, or an independent coke boiler, to provide hot water, would require a comparatively extensive

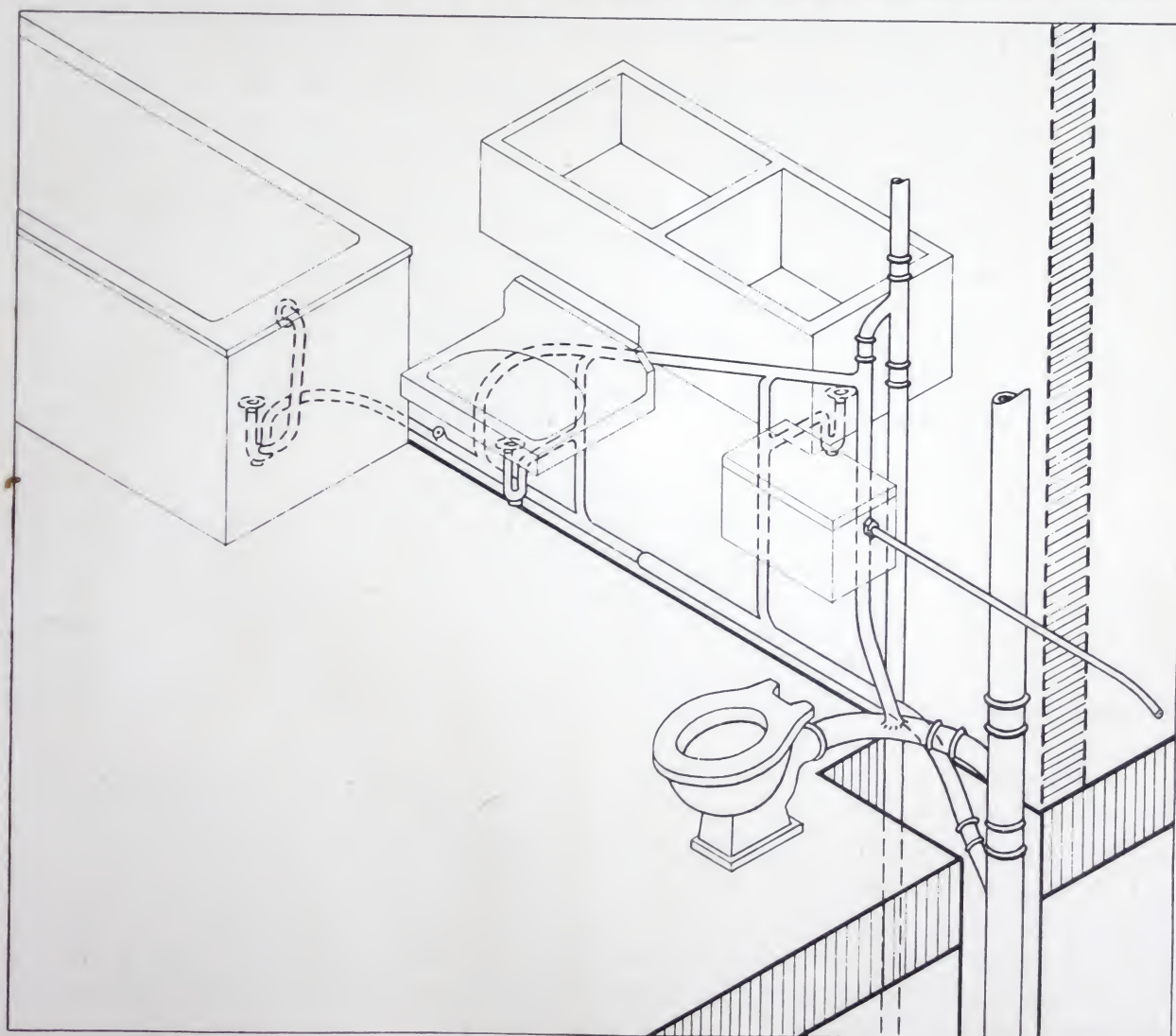


Fig. 8

pipings and storage system for each flat, with the necessary disruption of partitions, etc., to provide routes for pipes. The instantaneous water heater is the logical answer to the need for the provision of a copious supply of hot water at any time required. As the provision of plumbing and sanitary services forms the major part of the work, the use of completely off-site prepared units, for assembly and connection on the site, would greatly accelerate its progress.

*A Scheme for the Conversion of the Larger House* (see pages 157-173)

Illustrates the conversion of a large town-house into eleven separate accommodations. Although there is considerable variation in the style of accommodation provided, each flat nevertheless has a separate bathroom and kitchen. The house in its original form could be regarded as one providing almost every amenity. The supply and waste-system however, although sufficient for the comparatively large requirements of the undivided house, will not meet the extended services required for conversion. This is perhaps an outstanding instance where great care must be exercised to ensure an adequate supply of cold water to each separate apartment.

If, for example, each of the eleven flats is to have a separate tap over the sink, from a common main supply, the size of the rising-main to supply these taps at the pressures normally available in London should be at least  $1\frac{1}{2}$  in. internal diameter. But if any other fittings are connected to the main-supply, the diameter of the rising-main will have to be increased accordingly. In the arrangement under review, however, it would appear most satisfactory to have two separate rising-mains—one to supply the three units on the front of the premises, say,  $\frac{3}{4}$  in. internal diameter, and one to supply the eight units at the back of the premises, say,  $1\frac{1}{4}$  in. internal diameter—and thus avoid the need for long branches to different parts of the house. A stop-valve should be placed on the branch from the rising main to each apartment, in order that the water-supply can be cut off, when desired, without affecting other apartments.

To provide for the total needs of the building, a storage capacity of about 1,000 gallons would be required. It is usual in large buildings such as this for tanks to be installed with capacities of between 600 and 1,000 gallons. With such storage-capacity all supply-points, including the cold supply to the instantaneous water-heaters, can be provided from the main tank, requiring possibly two separate down-services, in the most convenient positions to suit the siting of the various units, on each floor. It will, of course, be necessary to provide separate control at each branch supplying each apartment, in addition to the main control-tap fitted close to the supply-tank.

The existing waste-system would almost certainly be of the fully ventilated type, and as a number of the new fittings are sited close to the original positions, it will be necessary only to connect up the new appliances to the old pipe-system. With separate stacks for soil and waste-pipes this should not present any serious difficulties. For apartments towards the front of the house, however, it will be necessary to provide a completely new stack, and here a one-pipe system might well be introduced. A connection to the drain in the area should be practicable, and each of the groups of fittings could be connected to the main waste and ventilating pipes.

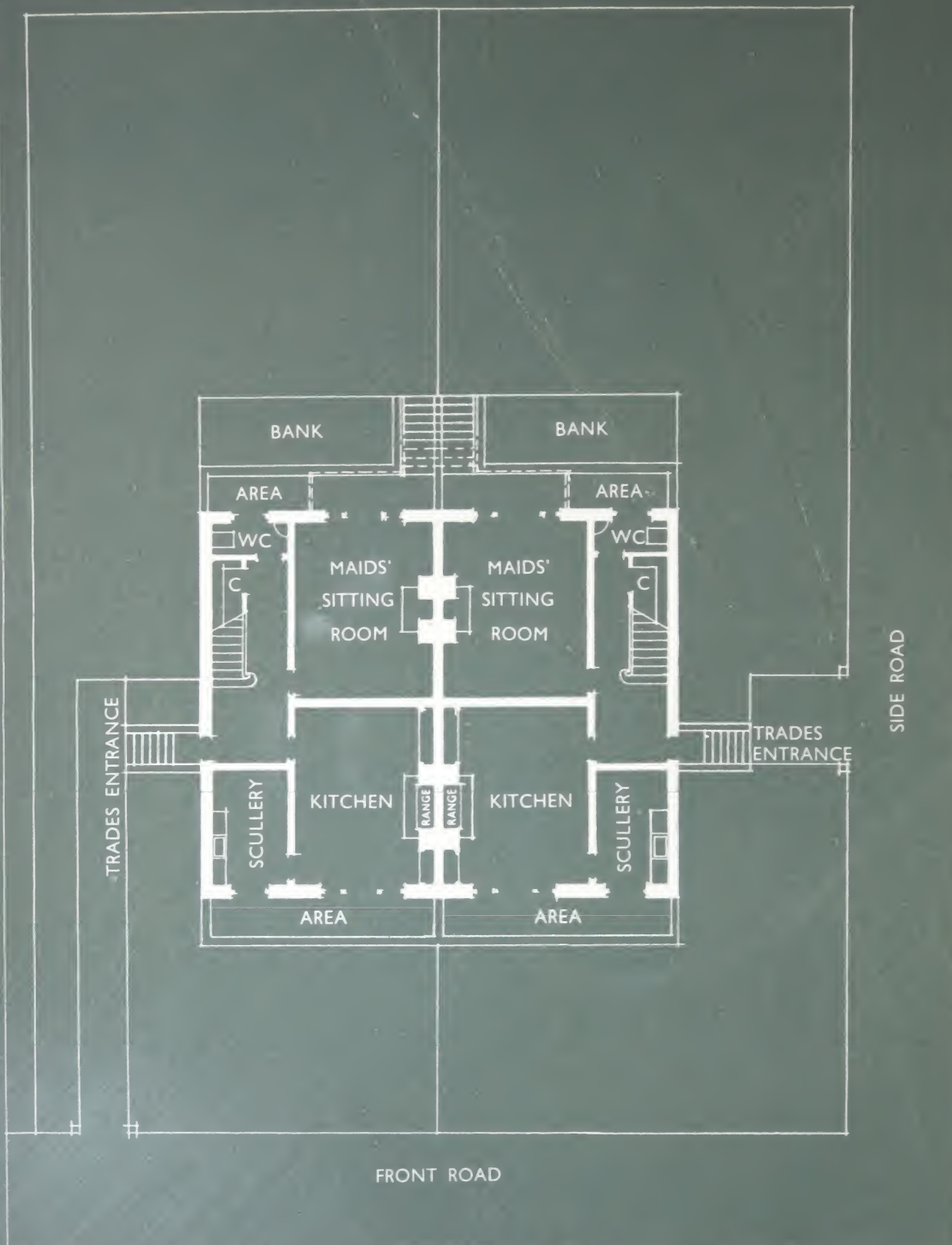
# PAIR OF FOUR-STORIED SEMI-DETACHED HOUSES

L. H. BUCKNELL, F.R.I.B.A., and RUTH ELLIS, A.R.I.B.A.



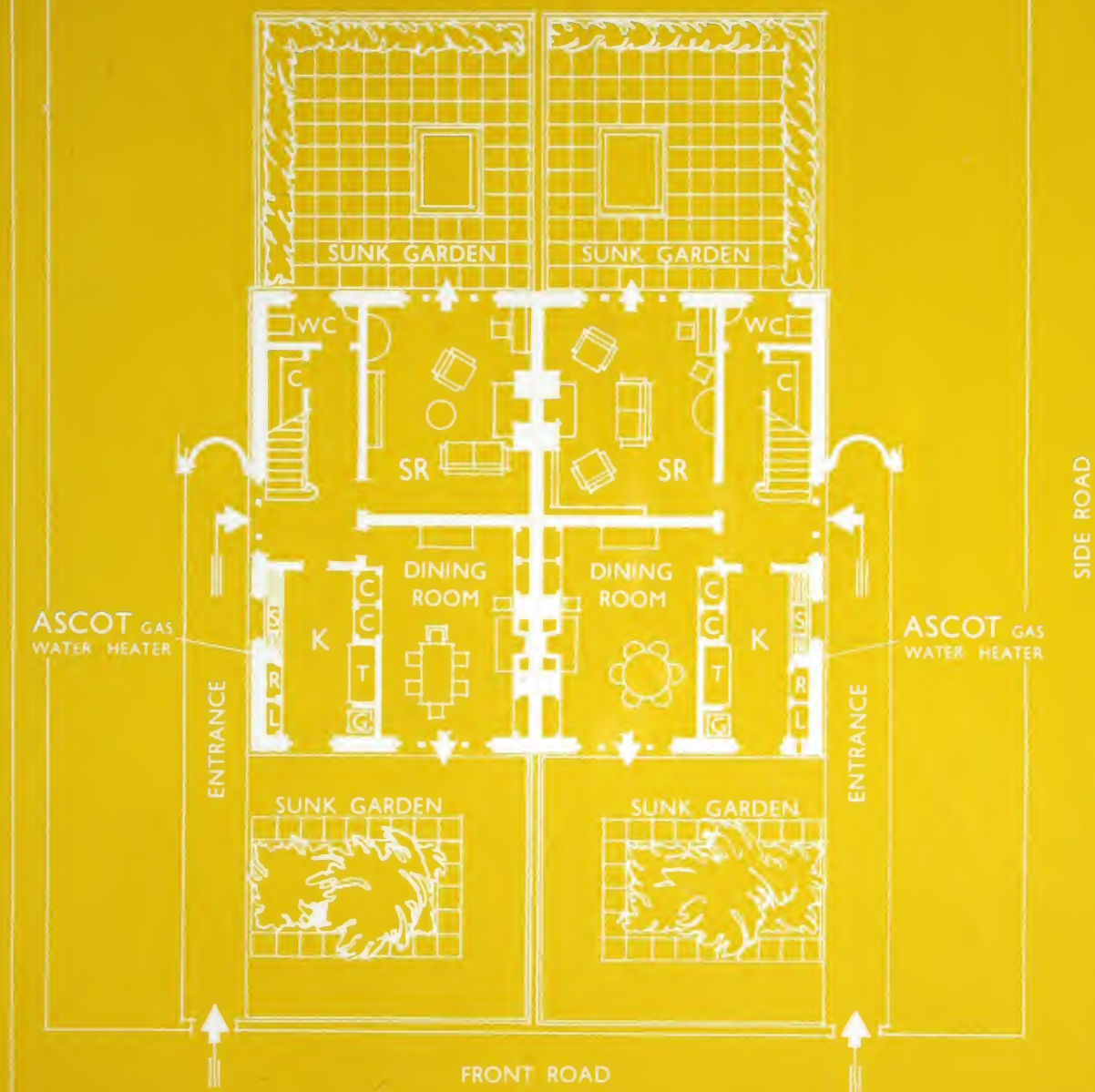
It is proposed to convert the two lower floors of each house into a maisonette, comprising dining room, living room, two bedrooms, kitchen, bathroom, etc.

Accommodation for business women is provided on the first and second floors, consisting of three bed-sitting rooms, a common dining room, room for resident maid, kitchen, bathrooms, etc.



BEFORE CONVERSION

PAIR OF FOUR-STORIED SEMI-DETACHED HOUSES

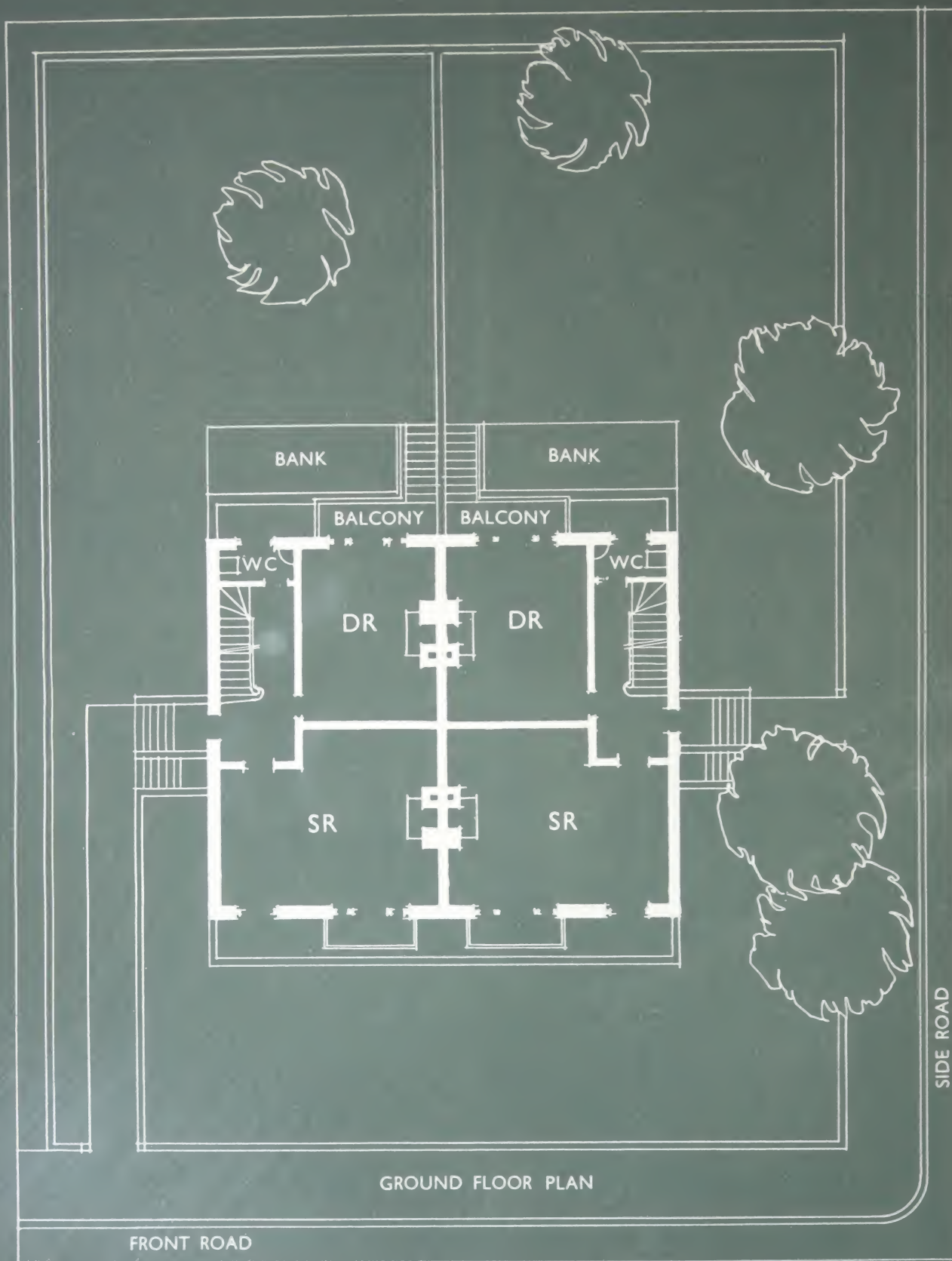


LOWER GROUND FLOOR OF MAISONETTE

AFTER CONVERSION

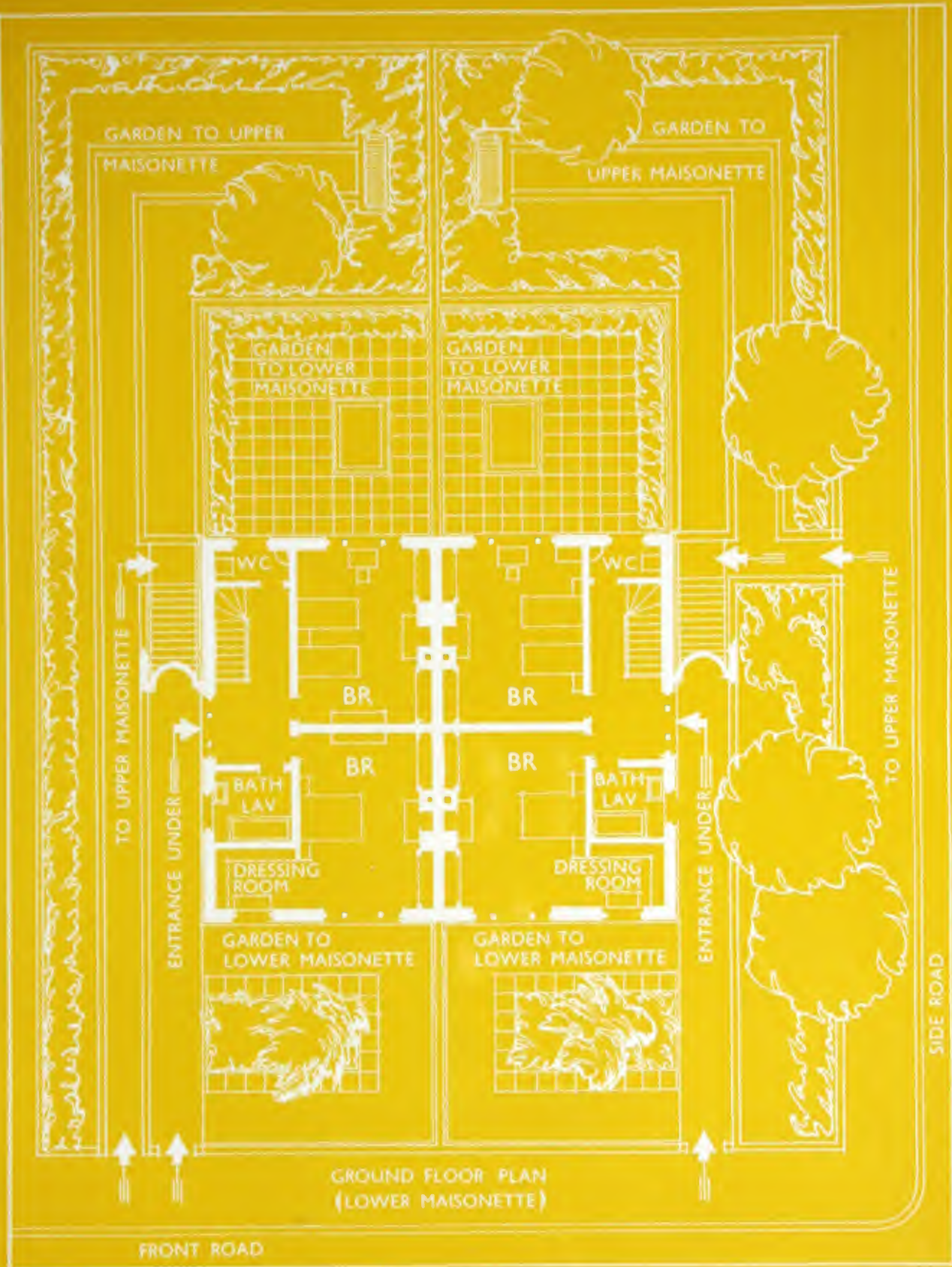


PAIR OF FOUR-STORIED SEMI-DETACHED HOUSES



BEFORE CONVERSION

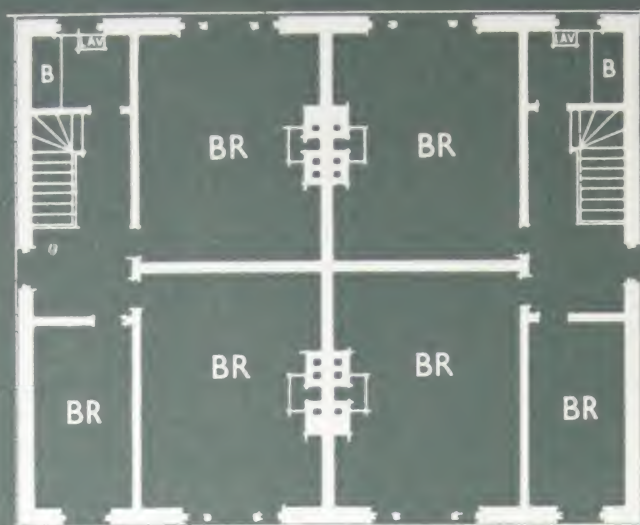
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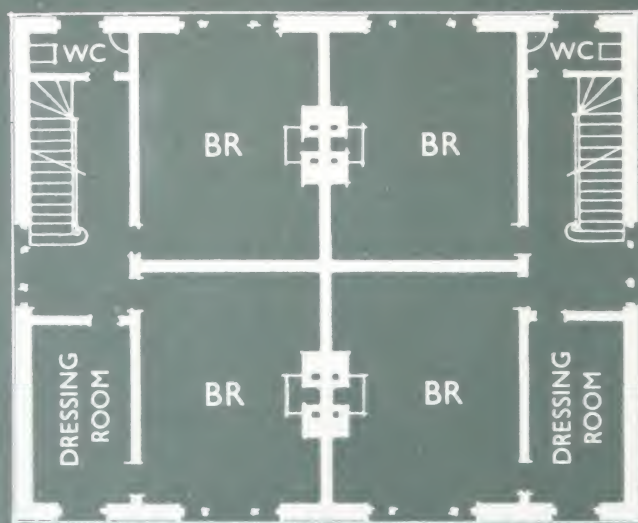
AFTER CONVERSION



PAIR OF FOUR-STORIED SEMI-DETACHED HOUSES



SECOND FLOOR



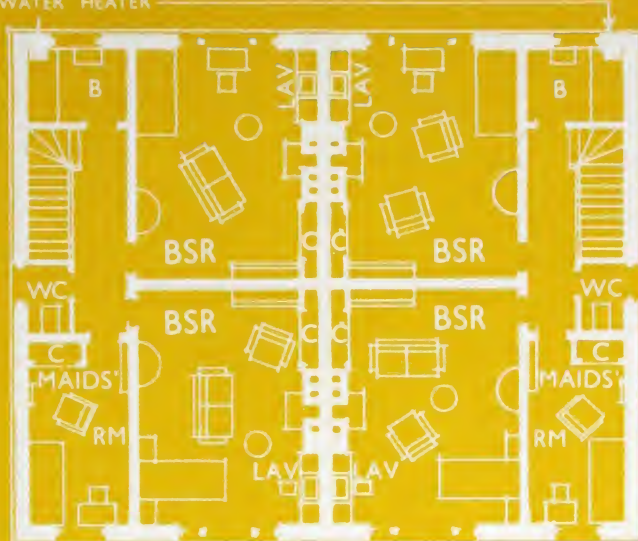
FIRST FLOOR



BEFORE CONVERSION

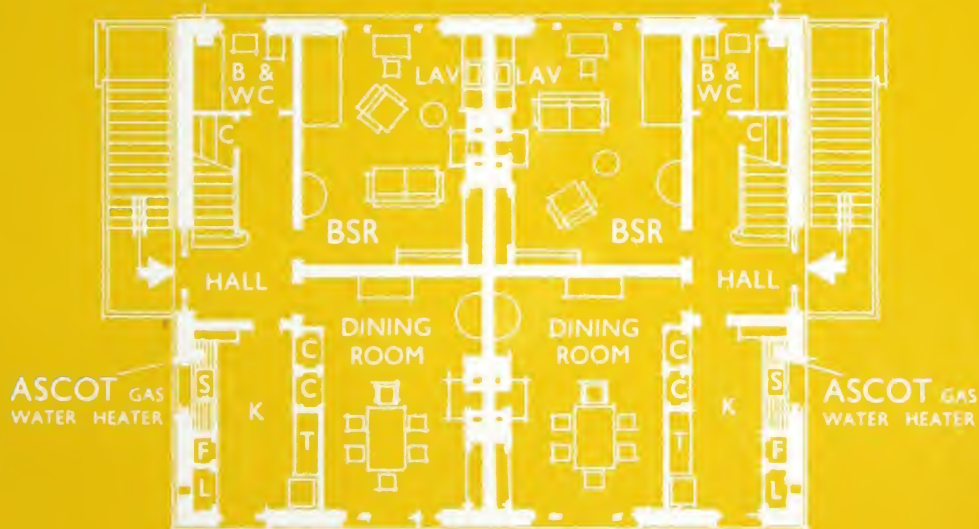
PAIR OF FOUR-STORIED SEMI-DETACHED HOUSES

ASCOT GAS  
WATER HEATER



SECOND FLOOR

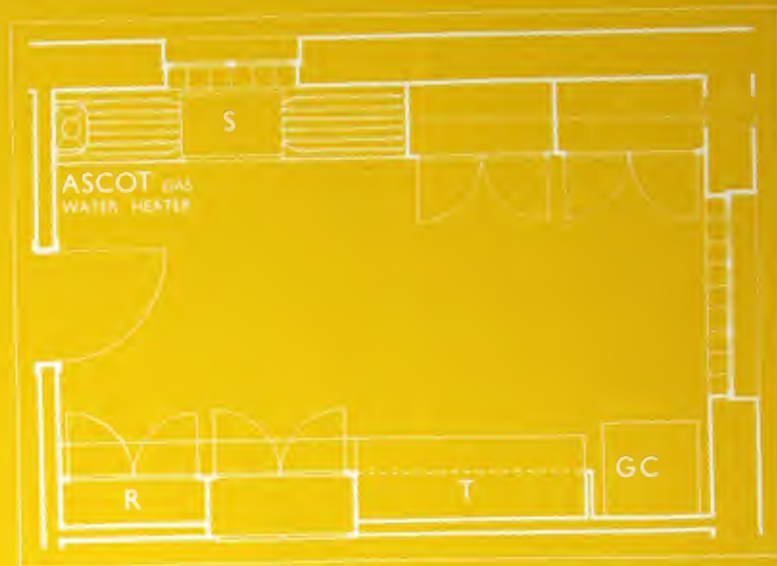
ASCOT GAS  
WATER HEATER



FIRST FLOOR

AFTER CONVERSION

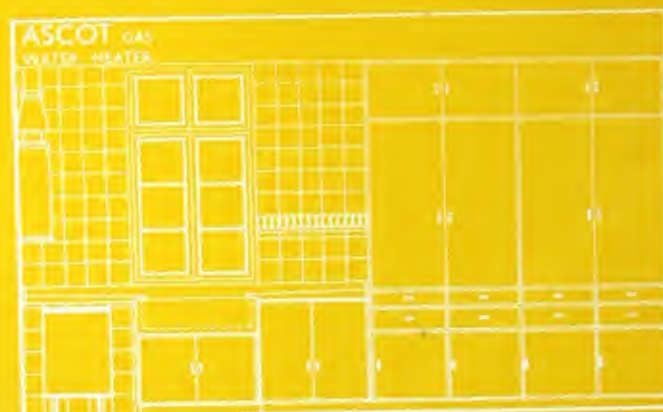




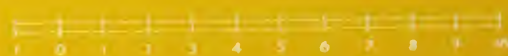
PLAN



SECTION



SECTION



# THE CITY FAMILY

## Suggestions for Converting the Town House into Family Flats

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Director, Cavendish Investment Trust Company  
Adviser to the Housing Centre



HERE is a fascination in living in cities, and it is evident that either from inclination or necessity many thousands of families will continue to live there (in spite of the accepted idea that the city is not the place for children) although they are badly served for accommodation.

### *Preserving the Large House*

The large spacious family-house is now obsolete on account of its unsuitability to modern domestic needs, yet many such substantial houses are either standing semi-derelict and rapidly degenerating into neglect and slumdom, or else are let off in rooms and lodgings which offer no real accommodation to the families who should be using them. This is aesthetically and practically wasteful, because these buildings are part of the fabric of our cities, and their good proportions and elegance give a background to modern living which we could never recapture were they to be swept away to give place to the monolithic block. Also, in these days of essential shortages, such fine, substantial structures are an asset which should be sensibly and economically used, for the good of that unit of the community most lauded but least considered—the family. The accompanying plans demonstrate that, taken in pairs, the typical terrace-house can be converted into excellent family-flats, providing as many amenities for a full family-life as any house.

### *The Needs of the Family*

The first psychological need of a family is for its own front-door. Thereby it becomes an entity, a complete little circle with its own interests and privacies. Next, families need space in which to organise their several activities, with sufficient suitable rooms in which to indulge in noise without continued repressions. There must also be a well-planned domestic circulation, which will allow the parents a certain degree of peace and charm of living ; for conversions which are just “ holes through the wall ” are utterly stultifying, and a strong argument against larger families. Sufficient space is essential, and in this respect the converted Georgian or Victorian house, thoughtfully planned around the daily needs of the proposed tenants, offers a home more in keeping with the needs of a boisterous family than does the boxy accommodation of the average modern block. A flat can become a well-loved home just as surely as can a house on the ground. It must, however, be construc-

tively planned so that each member can settle into his own niche, and should include a long-term policy of possible subdivision into individual bed-studies, as the family grows older and requires more privacy.

### *The Ground Floor for the Family*

Most large houses lend themselves to conversion into family-flats on the ground and first floors, with smaller lettings above, but on no account should family-flats be relegated to the upper floors. This is a simple way of solving the difficulty of family accommodation, because of the comparative cheapness of upper space and the difficulty of handling top-lettings. But the lot of the housewife-mother with little domestic help is sufficiently difficult without the additional labour of carrying children and gear to the upper floors. Moreover, children should have easy access to out-of-doors without the danger and difficulty of two or more flights of stairs ; so that on every count the family should have ground and first-floor accommodation, leaving the top to be planned for single people who are out all day.

### *The Basement*

Planning for basement-lettings is a retrograde step and not in accordance with future standards; and although the Government report on Conversion advocates the incorporation of the basement as part of a ground-floor maisonette, the feeling is that this is a short-term policy because, as scarcities decrease, there will be a revulsion against basement conditions, especially for children, whereby such a conversion will not enjoy the twenty-five years of useful life for which it should have been planned.

On the other hand, a growing demand for necessary amenities such as a bookable laundry, a games or hobbies-room, and additional storage-space, make their inclusion in the basement a very good policy, since such additions to modernity and convenience will lift the flats into a better rental-class and easily compensate for the small loss of profit on a basement-letting. Where terrace-houses are converted singly, the basement must be incorporated, to counteract the difficulty and awkwardness of single-house conversions ; but basement living-rooms are definitely sub-standard, and for that reason a two-house conversion is a better proposition. Moreover, it is more economic in regard to the space spent on public entrances, as unnecessary public space is both a loss of rental and a continual drain on a conversion.

### *The Owner's Point of View*

Family-housing is a priority-matter, especially in view of the imminent decline in the population ; and it would seem a wise policy to convert terraces of houses, especially those surrounding green squares and gardens, such as were requisitioned as offices during the war. These make ideal communities of families, providing all the amenities of houses, with plenty of scope for young life, and no discrimination against reasonable healthy noise.

Large-unit conversions, however, cannot be left entirely to private enterprise, which is well aware that a large flat does not bring in as high a rental as several small lettings, and that wear and tear and complaints are higher. For these reasons family-flats are not popular with owners who, as a class, have had such a rough deal during the war that they

have neither the surplus nor the incentive to act as philanthropists. Therefore, since the family is regarded as a national asset and its re-establishment is so urgent, it is essential that the Local Authority should combine with private enterprise to hasten the accommodation of families of all classes, and that the owner should not only be assisted to convert but should also be provided with some recompense for the inevitably greater wear and tear.

If permits and a subsidy were easily available for family-conversions, but not for the smaller and more profitable lettings, there are many owners who would take advantage of the subsidy, rather than let their houses deteriorate. By this means the rehabilitation of much substantial property, plus the provision of spacious homes, would result, with advantage to owner and tenant alike; and the homes provided would be infinitely more suitable than the cramped accommodation of a "prefab."

#### *Plan 1*

Take Plan 1 as an example of planning for the young family. And notice how the domestic circulation is thought-out from the housewife's point of view.

This flat has a normal front-door and hall, with the living-entertaining room off it and the master bed-room adjacent, so that the grown-ups' section is compact and convenient and within easy access of the kitchen. It is essential that entertaining should be planned for, even in a restricted space, and it will be seen that the grown-ups' section of the flat is quite perfect for the servicing of a small party, and that the evenings' activities need not disturb the children.

#### *The Kitchen*

The space leading to the kitchen is fitted as a "dinette" with a refectory-type table, and here the children's meals are served during the day. This kitchen-dinette unit is a work-saver of the first order, for it does away with the annoying necessity of interrupting the living-room activities to set children's meals, and so allows for more elegance of living, and a more sophisticated style of furnishing, for the use of the grown-ups.

The kitchen-window is enlarged, and use is made of glass-bricks and panels whereby light and an air of modernity are introduced. The use of artificial light and good modern colour could give a cheerful appearance to this most useful space.

#### *Providing for Children*

The children's corridor and rooms are separate, and can be curtained off if desired. This adds to the peace of the family, and overcomes that bugbear of flat-life, insufficient sleep for the children. The bath-room, too, is convenient for their section, and they have easy access to the basement and the yard, or out to the gardens in the Square, without traipsing with muddy shoes through the front-hall.

In the basement is a wet-weather play-room, a "rumpus-room," where children can let off excess energy as far removed from other tenants as possible. The eternal repression of natural boisterousness, necessary in an upstairs flat, is bad for morale, but in a remote lower room their games and hobbies can be undisturbed and their possessions can remain constructively untidy.

### *The Basement Laundry*

The basement will also provide space for a bookable laundry which, with the mounting costs of laundries, is fast becoming a necessity for every family. Equipment such as sinks, gas or electric washing-machines, Ascot water-heaters with slot-meters, and drying and airing-cabinets should, of course, be installed ; for modern laundry-equipment has reduced labour and time to such an extent that a family-wash can be done and ironed and aired in one day. This eliminates another of the bugbears of flat life—the constant difficulty of drying and airing clothes, and the unsightliness of clothes-lines in unsuitable places.

The remainder of the basement offers space for adult-hobbies, or a play-room with ping-pong, darts, etc. There should be space, too, for additional rentable storage. The completeness and modernity of such amenities add considerably to the ease of living, and consequently to the quality of the lettings.

It will be seen that this ground-floor flat is planned so that members of the family can each live a full life without getting in one another's way, and so that the day and evening activities can be ordered in sequence, as every housewife desires.

### *The First Floor*

The first-floor is for a family with school-children, who require separate rooms for study and, incidentally, for entertaining their friends. In this case the active end of the flat is separate from the more studious end, and this is increasingly important in these days of radio. Concentration on studies is very important, and in a flat planned with a quiet-end which can be entirely shut off, it is possible for parents to enjoy the radio without disturbing the work, play or sleep of the children.

The kitchen-diner is a work-saver for informal meals, and the kitchen is convenient for the service of more formal meals in the living-room.

The half-landing room could be available for either the ground or first-floor flat as an additional bed-room, possibly for a domestic who would sleep in and have her own bed-sitter. Or it might be used for a general utility-room, or as a study remote from the traffic of the home.

### *The Top Floor*

The top-floor lettings are single-person units of which the tenants are likely to be out all day, and although the accommodation is minimum, the rooms are planned for as much charm of living as possible. Such tenants require convenience, and a certain elegance, in a very restricted space, and these rooms are an advance on the "bed-sitter" (which is the lowest form of letting), since each has a small partitioned Dormette, large enough to accommodate a bed, a wardrobe and a bedside cabinet—difficult things to camouflage in a sitting-room. There is also a small kitchen-cabinet in the space beside the entrance-door, fitted with shelves, a flat table, a hot-point and a kettle, where the odd snack can be taken. By this means the living-room is kept free of cooking and sleeping impedimenta for the decent entertainment of friends.

The largest of these bed-sitters has a small kitchen and dressing-room, which removes cooking and dressing still further and so allows for more pleasurable living. These tenants share the one bath-room, with its slot gas water-heater, and also the one W.C.

A hatch for the delivery of parcels is much appreciated by people who are out during delivery-hours.

### *Plan 2*

In the second series of plans, two houses with adjacent stairs and halls have been converted into the same type of family-flats. Circulation is through the party-wall, which results in a proportionately small waste of public space, and allows for a compact and serviceable flat, planned with consideration for each member of the family.

The back-to-back sites of the kitchens and bath-rooms is an advantage, as the plumbing is thus economically concentrated, enabling the water to be heated by one Multi-Point gas water-heater, instead of by several smaller heaters.

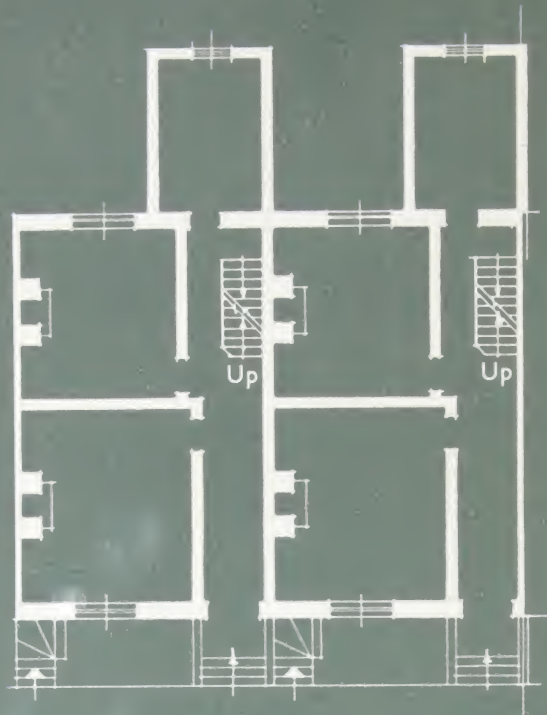
### *The Utility Room*

The ground-floor flat has the same separate children's and grown-ups' sections, and much the same domestic circulation, with the addition of a utility-room in place of the private entrance-hall. This shortens the corridor—always a nuisance in conversions—and makes more use of space. A utility-room is of inestimable value in a flat, and of much more use than a front-hall and steps, which require cleaning. It can take the pram, and such oddments, even an over-night bed, and is useful for undisturbed work and sewing.

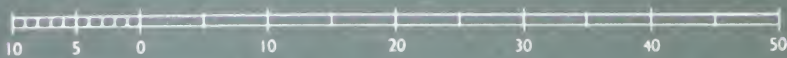
### *The Two-stage Conversion*

A good, full conversion should be as modern and labour-saving as a new house. It is recognised, however, that such a "counsel of perfection" cannot be achieved at present. It is difficult enough to achieve even an adequate job. But as the need for a "home with a front door" is vital, it is suggested that two-stage conversions, from which the accompanying plans have evolved, should be adopted. Under this scheme, an interim-conversion is first carried out with a minimum of labour, material and equipment. Later on, when the supply situation is easier, the conversion can be carried to its second and completed stage. The first stage provides at least privacy and shelter in the shortest possible time, with the possibility, later, of a complete home. And owners who would not countenance the division of their properties into shoddy flats would willingly undertake a progressive conversion towards an ultimately first-class job.

It is sad to see the deterioration of fine substantial properties which are suitable for conversion and repair. Let us hope that the Government will soon bridge the gap between owners who have too much wasteful house-room and desperate homeless families which have none.



GROUND FLOOR



BEFORE CONVERSION

TOWN HOUSE INTO FAMILY FLATS

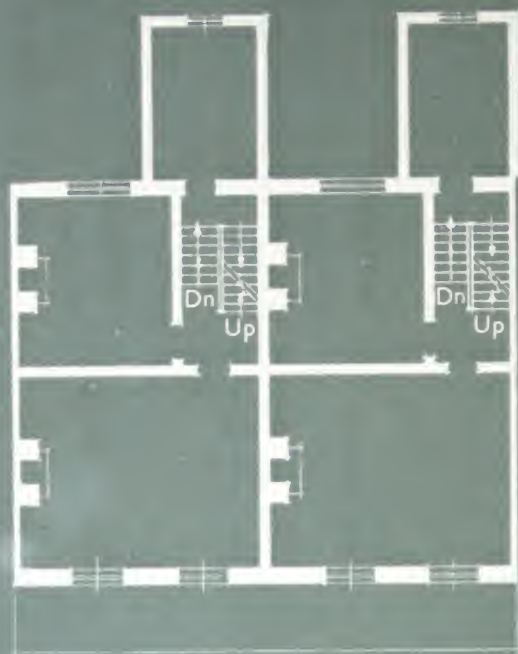


GROUND FLOOR

AFTER CONVERSION



TOWN HOUSE INTO FAMILY FLATS



FIRST FLOOR

BEFORE CONVERSION



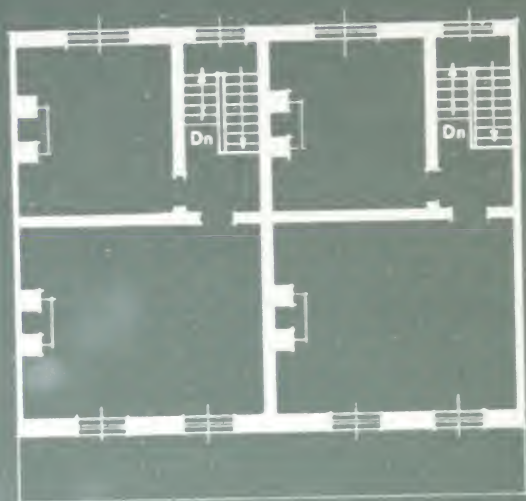
TOWN HOUSE INTO FAMILY FLATS



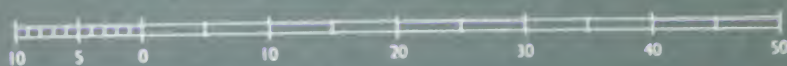
AFTER CONVERSION



TOWN HOUSE INTO FAMILY FLATS



SECOND FLOOR



BEFORE CONVERSION

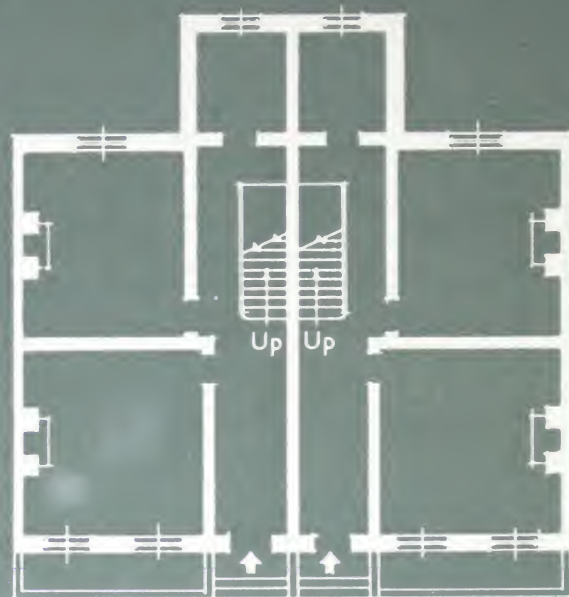
TOWN HOUSE INTO FAMILY FLATS



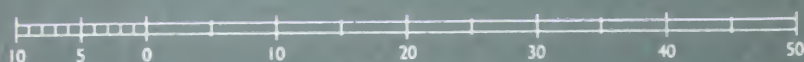
SECOND FLOOR

AFTER CONVERSION



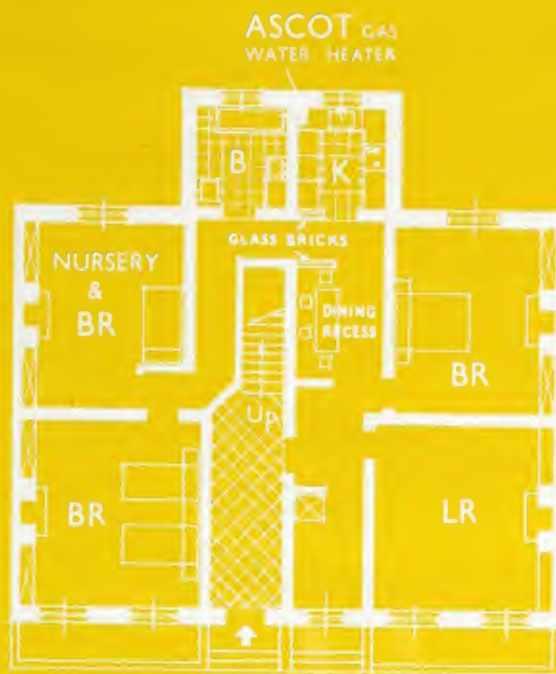


GROUND FLOOR



BEFORE CONVERSION

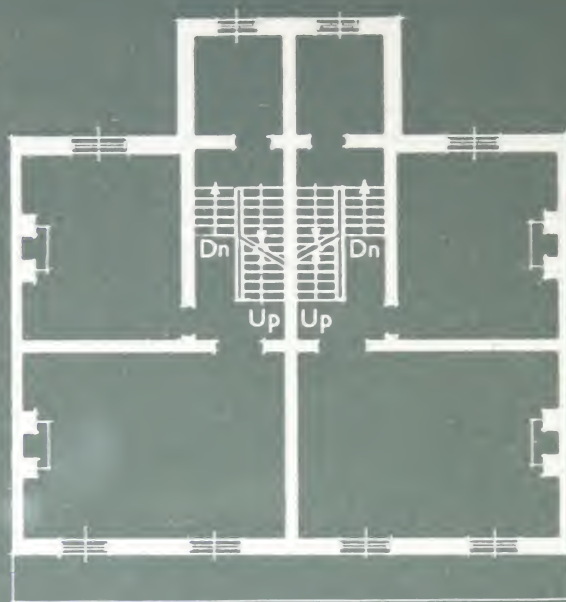
TOWN HOUSE INTO FAMILY FLATS



GROUND FLOOR

AFTER CONVERSION

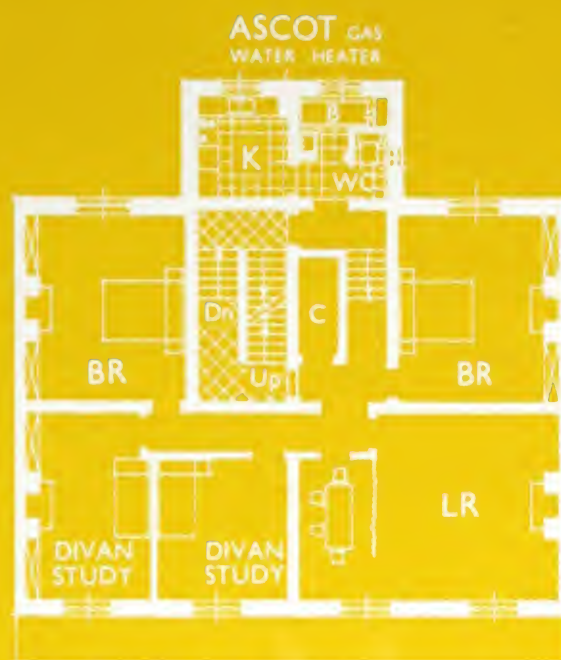




FIRST FLOOR



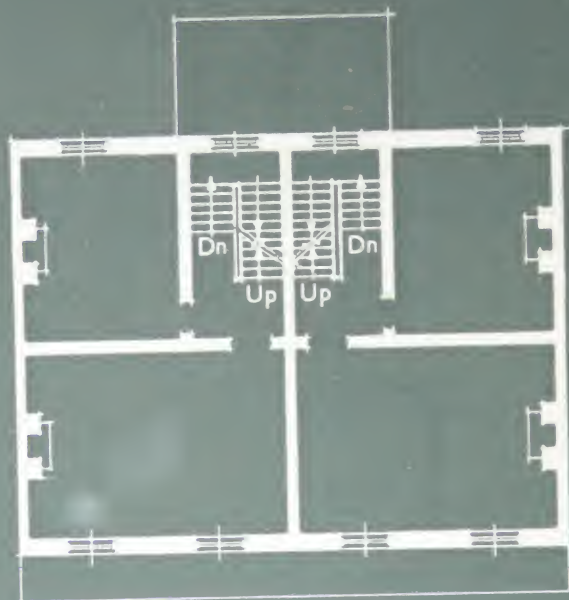
BEFORE CONVERSION



FIRST FLOOR

AFTER CONVERSION



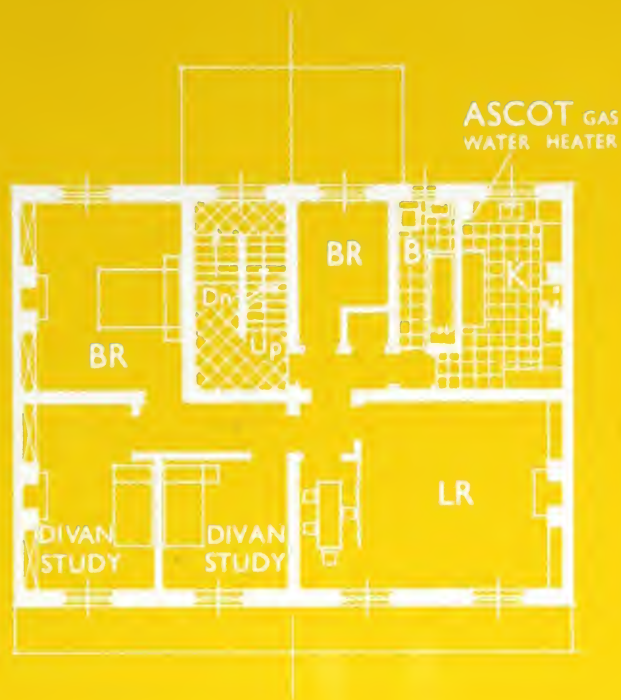


SECOND FLOOR



BEFORE CONVERSION

TOWN HOUSE INTO FAMILY FLATS

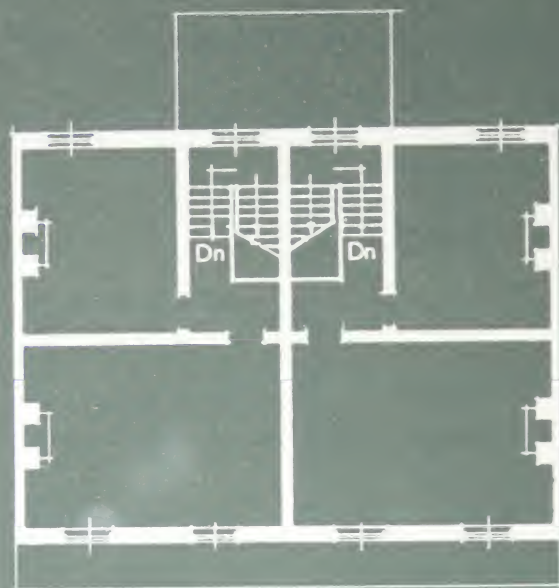


SECOND FLOOR

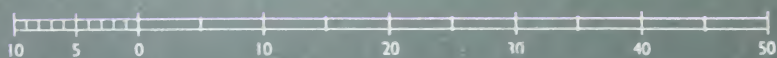
AFTER CONVERSION



TOWN HOUSE INTO FAMILY FLATS



THIRD FLOOR



BEFORE CONVERSION

TOWN HOUSE INTO FAMILY FLATS



THIRD FLOOR

AFTER CONVERSION



TOWN HOUSE INTO FAMILY FLATS

# REGENCY TERRACE HOUSES IN BAYSWATER

JOHN GREY, F.R.I.B.A.



HIS scheme shows the conversion of a pair of terraced houses in a good class residential neighbourhood into a small block of self-contained flats and maisonettes. The houses concerned were of fine Regency character with lofty rooms, and it was therefore decided that their distinguished front elevations must not be interfered with and that the larger rooms should be cut up as little as possible.

As the road frontage faced South-West, each unit was planned to run from back to front with living rooms looking out over the Square and with kitchens and bathrooms overlooking the back gardens.

The two houses were joined into one by breaking through the party wall, and as this made one of the main staircases redundant, it was taken out and the stair well floored over to provide additional accommodation in the flats.

One of the main entrance doors from the street was also removed and replaced by a window matching up with the rest. A lift was installed in a convenient position at the foot of the remaining staircase running from basement to third floor level.

The existing basements consisted of rather dark and gloomy kitchens and service rooms usually found in houses of this period, and it was therefore considered that they were unsuitable for residential purposes. One half was allocated to storage purposes, each tenant having his own small storeroom for luggage, etc., and a small laundry room was also provided for home washing. As an experiment, the other half of the basement was converted into a suite of rooms which could be used by the tenants for private parties or even let off to outsiders for special occasions. It was thought that this might prove a popular feature since there is an acute shortage in London of accommodation of this sort.

On the ground floor there is a direct way through to the back gardens which are for the use of all the tenants. Space is provided for prams and cycles.

From the third floor onwards the internal staircases have been retained and the two upper floors converted into maisonettes. This arrangement entailed the minimum disturbance to the existing fabric and added variety to the accommodation provided.

It should be noted that each flat has its own back door approached from the staircase landings and a service balcony for fuel and dustbins.

THE TOTAL ACCOMMODATION PROVIDED IS AS FOLLOWS:

### BASEMENT

Tenants' Stores. Laundry. Entertainment Suite. Service Rooms and Lavatories.

### GROUND FLOOR

#### FLAT NO. 1

Bed-sitting room  
Kitchen  
Bathroom

Cycle and Pram Stores

#### FLAT NO. 2

Sitting room with bed recess  
Second bedroom  
Dressing space  
Kitchen  
Bathroom  
Terrace

### FIRST FLOOR

#### FLAT NO. 3

Bed-sitting room  
Kitchen  
Bathroom

#### FLAT NO. 4

Sitting room with bed recess  
Second bedroom  
Dressing space  
Bathroom  
Kitchen

### SECOND FLOOR

#### FLAT NO. 5

Bed-sitting room  
Kitchen  
Bathroom

#### FLAT NO. 6

Sitting room with bed recess  
Second bedroom  
Dressing space  
Bathroom  
Kitchen

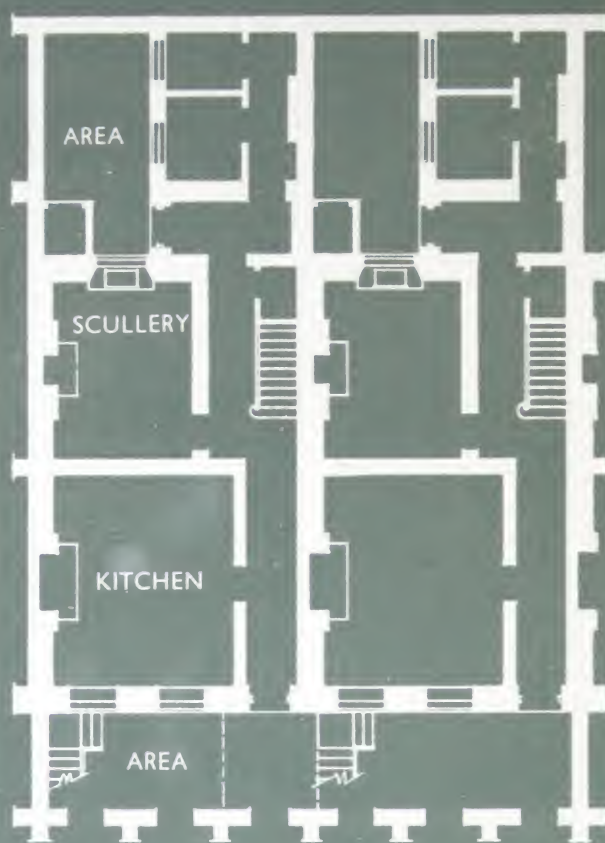
### THIRD AND FOURTH FLOORS

#### MAISONETTE NO. 1

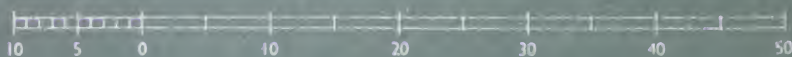
Living room  
Study  
Kitchen-Dining room  
Three bedrooms  
Bathroom  
W.C.

#### MAISONETTE NO. 2

Living room  
Study  
Dining room  
Kitchen  
Three bedrooms  
Bathroom  
W.C.

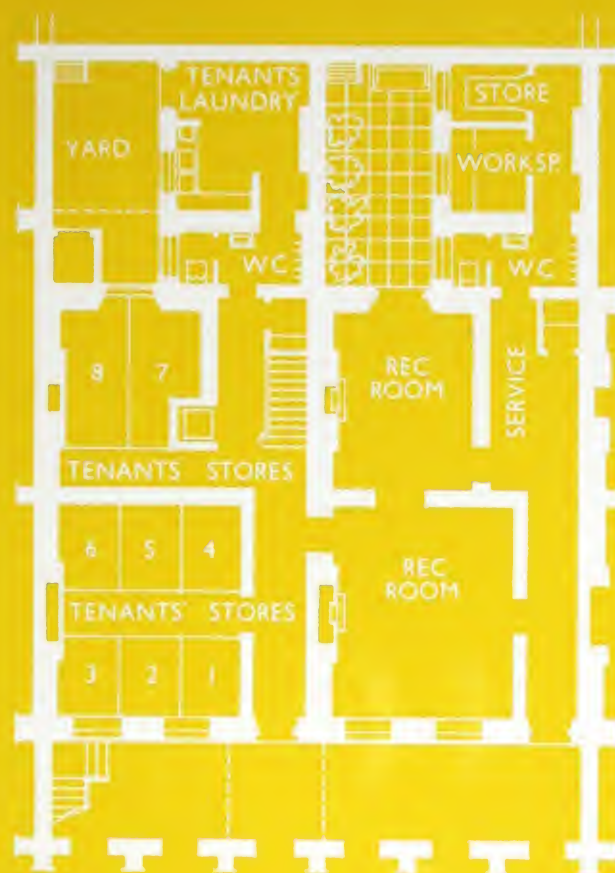


BASEMENT



BEFORE CONVERSION

REGENCY TERRACE HOUSES IN BAYSWATER

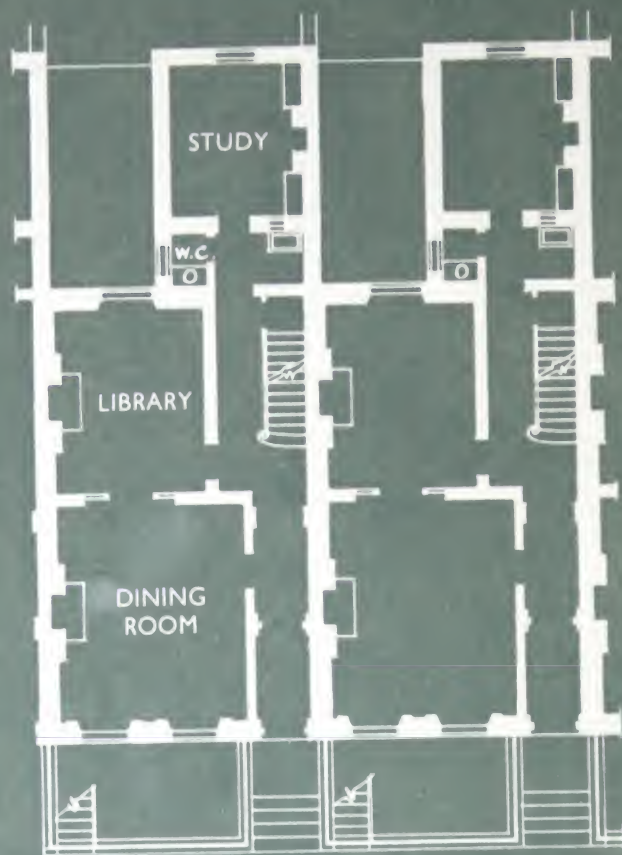


BASEMENT

AFTER CONVERSION



REGENCY TERRACE HOUSES IN BAYSWATER

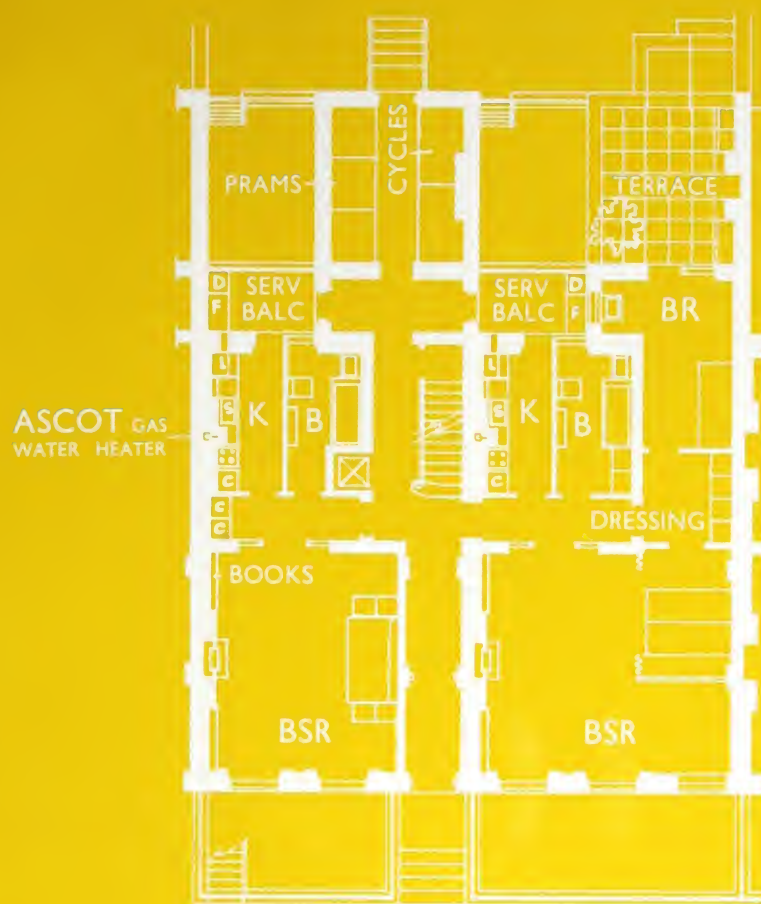


GROUND FLOOR

BEFORE CONVERSION



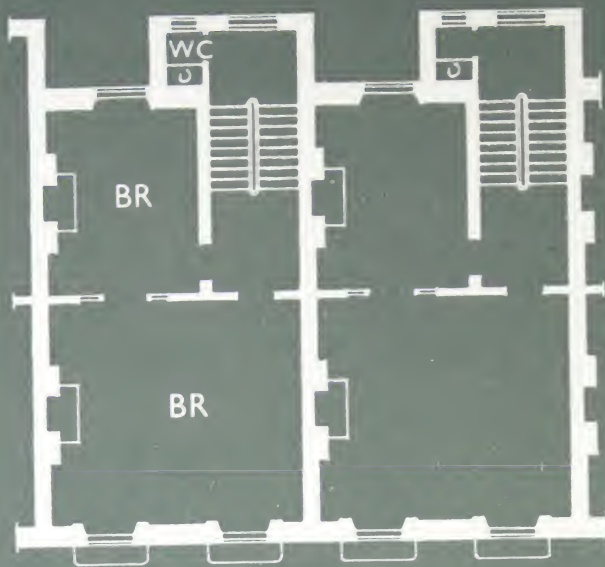
REGENCY TERRACE HOUSES IN BAYSWATER



GROUND FLOOR

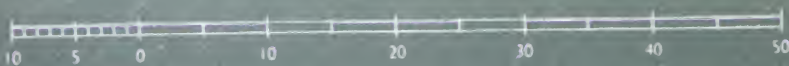
AFTER CONVERSION



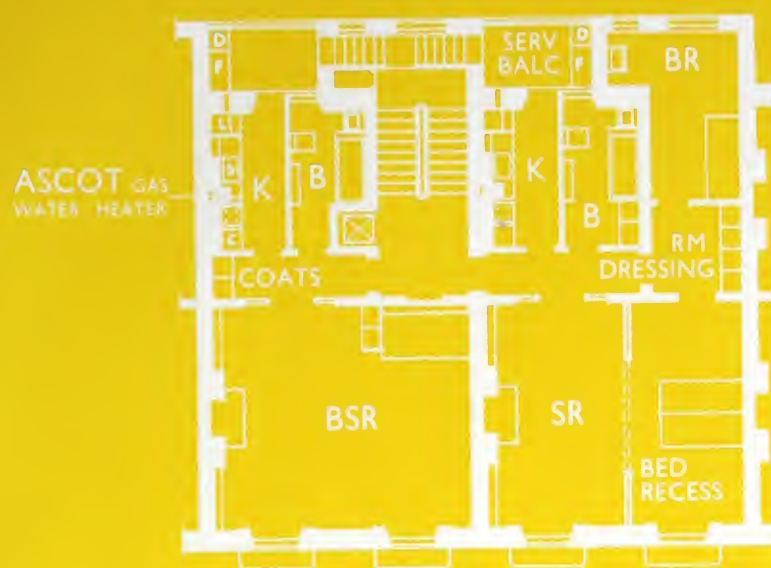


SECOND FLOOR

FIRST FLOOR SIMILAR



BEFORE CONVERSION

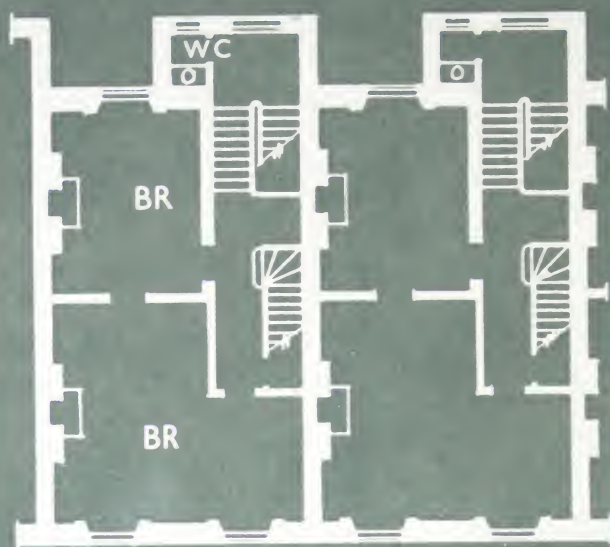


SECOND FLOOR

FIRST FLOOR SIMILAR

AFTER CONVERSION

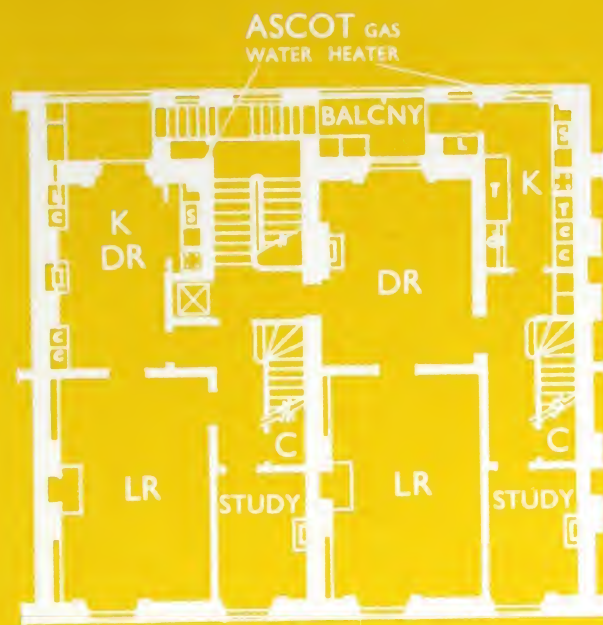




THIRD FLOOR



BEFORE CONVERSION

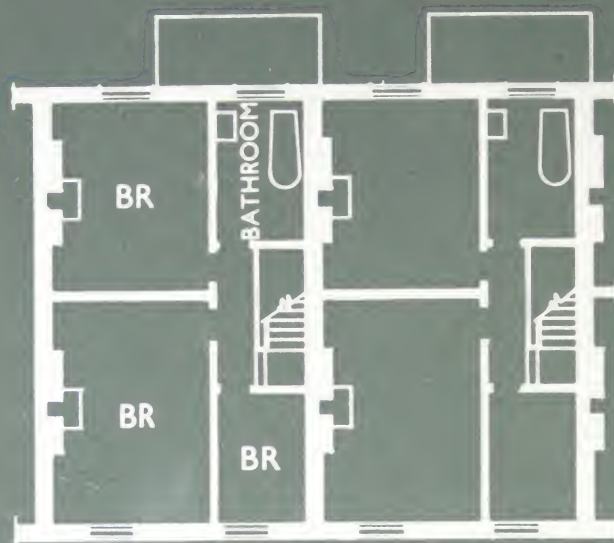


THIRD FLOOR

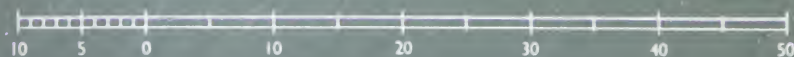
AFTER CONVERSION



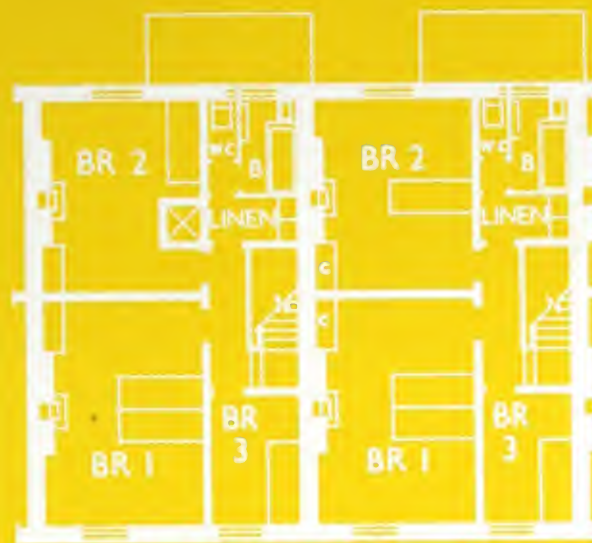
REGENCY TERRACE HOUSES IN BAYSWATER



FOURTH FLOOR



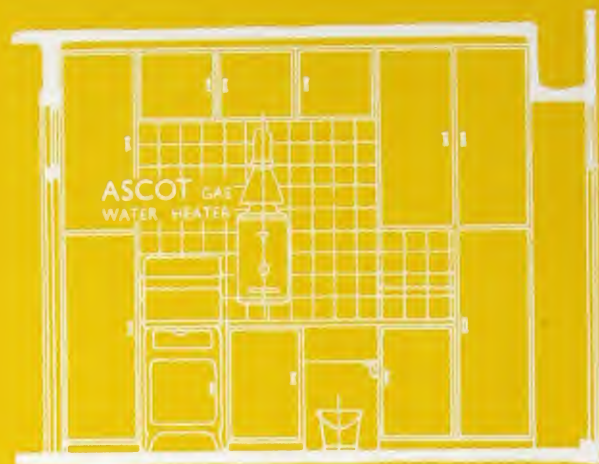
BEFORE CONVERSION



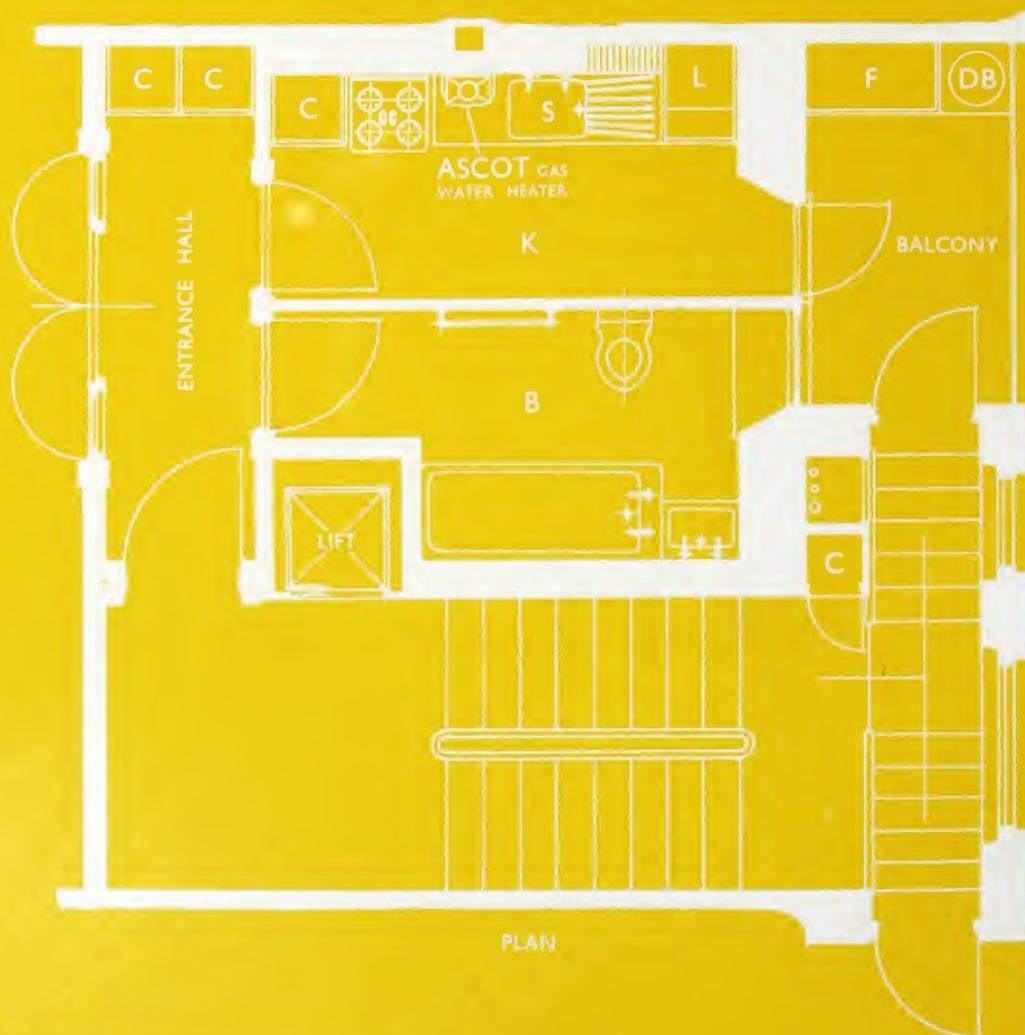
FOURTH FLOOR

AFTER CONVERSION





SECTION



PLAN



# TYPICAL TOWN HOUSE CIRCA 1870

MARY ANDERSON, A.R.I.B.A.



HOUSE of this type is not easy to convert for present-day use owing to the size and lofty proportions of the rooms. This style of town dwelling may, however, be ideal for those who require only two bedrooms and who can pay a rent of more than £100 per annum.

From the plans it will be seen that two adjoining houses have been taken for conversion. This allows for two flats on each floor excluding the basement.

On the ground floor part of the floor area, which on the upper floors may be utilised in the flats, is taken up by the entrance hall. For this reason one flat on the ground floor has a small kitchenette only. This would suit a tenant without children. The second flat on the ground floor has two large bedrooms, one with a dressing room, a very large living room and a dining room with kitchen and larder. The living and dining rooms in this case form a unit and the bedroom quarters form another unit.

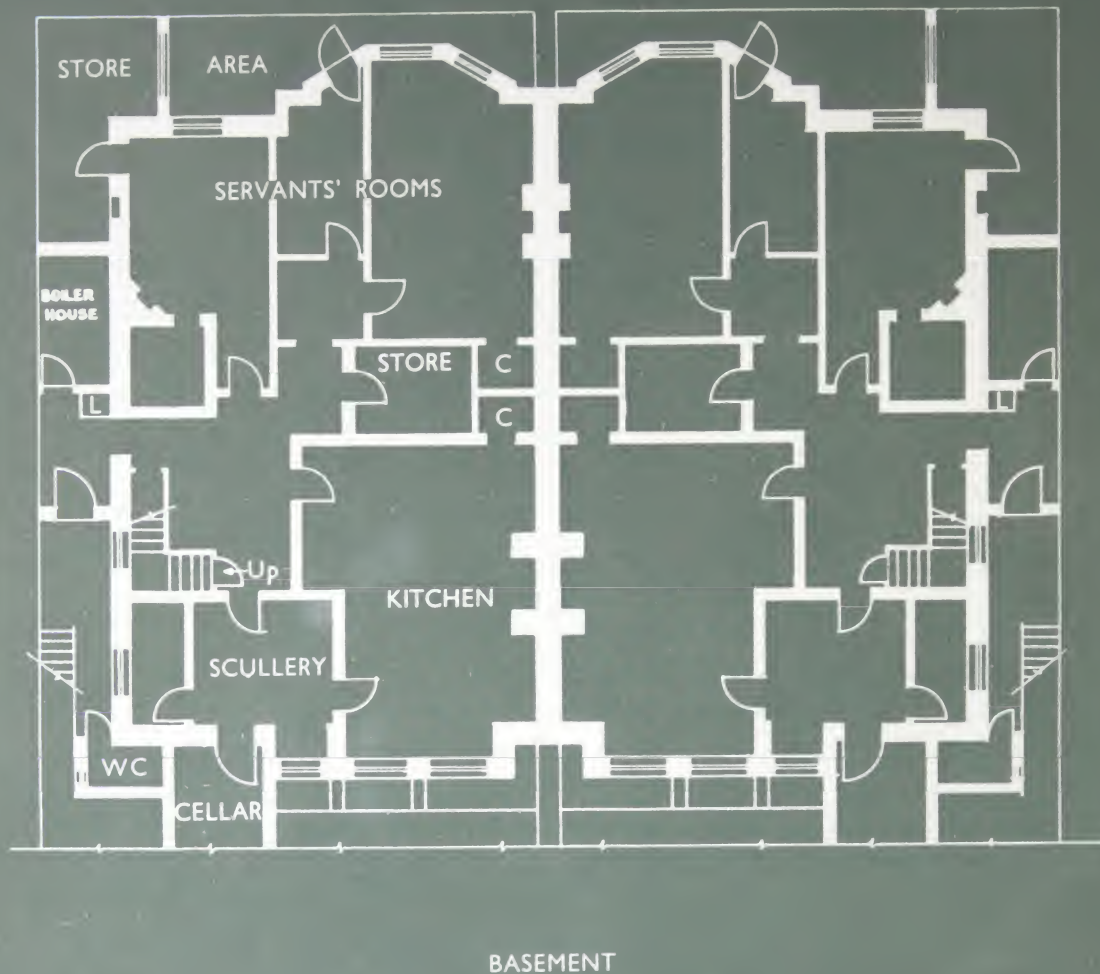
On the first and second floors the plans are similar, both flats in either case having a way through the living room to a passage which gives access to bedrooms and bathrooms. It would have been possible to make the living room completely independent, but in so doing the fine proportions of the room would have been spoiled and not much advantage gained. Alternative schemes are shown for the arrangement of dining room and kitchen, one giving a larger room to be used as a combined kitchen and dining room.

The third floor with its dormer windows above the cornice differs from the first and second floors. In one flat the dining room with its kitchen in an alcove leads off from the living room, and in the other a small lobby has been made giving separate access to kitchen and dining room.

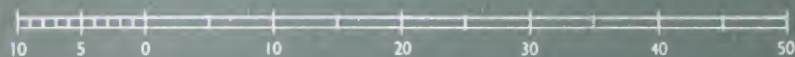
In all flats plenty of cupboard space has been provided.

Heating in this type of flat conversion would normally be by gas or electricity, though there is provision for coal fires. Independent coal storage would be in a bunker provided for each flat and not in the basement cellars.

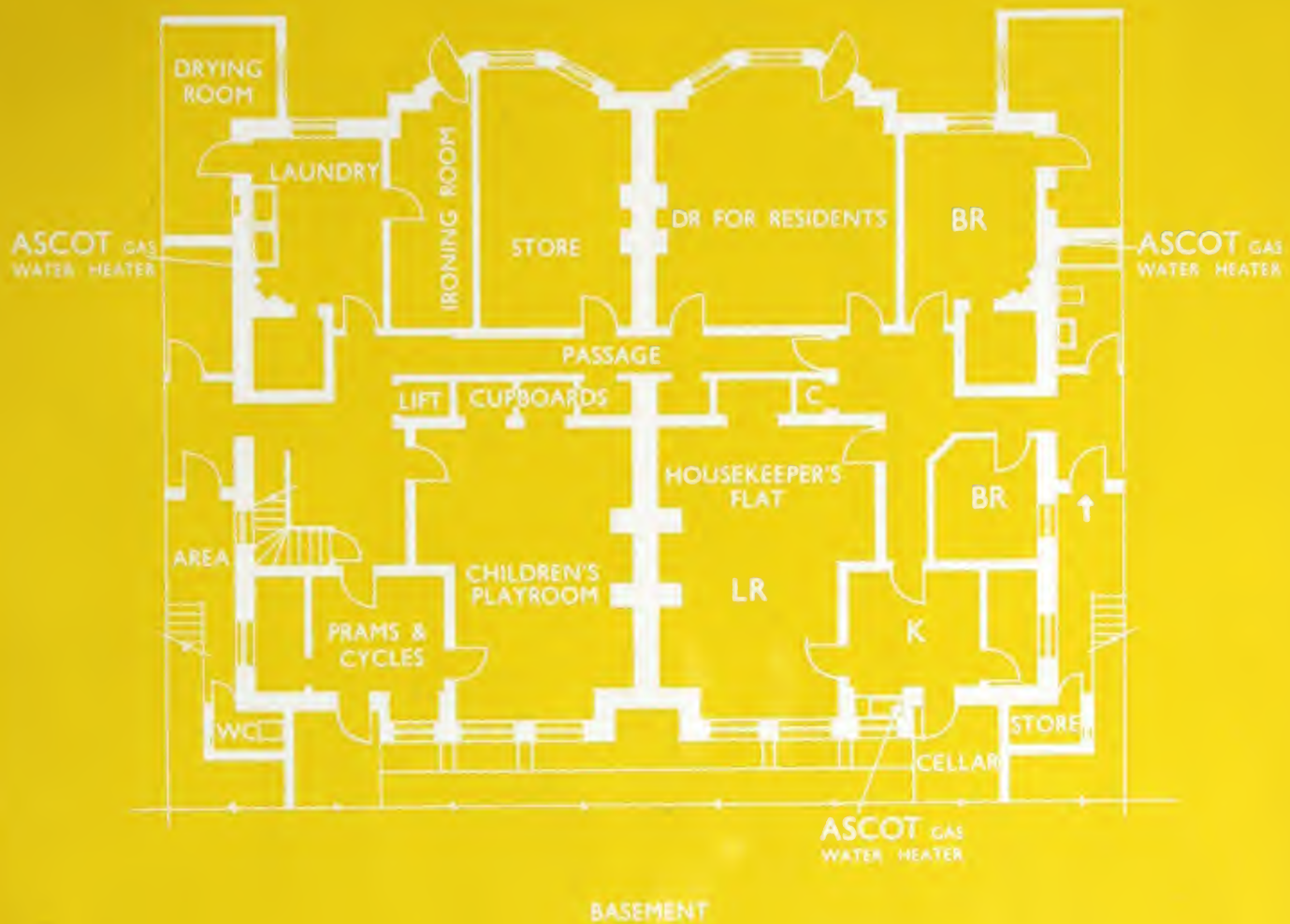
In this type of dwelling house there should be a resident housekeeper, although the flats are to be let unfurnished. The staircase is common property and must be kept clean ; the lift must be kept in working order ; the rubbish bins from each flat must be cleared ; the boiler must be attended to ; and it has been suggested that there should be a common dining room in the basement for those residents who wish to avail themselves of the services of the housekeeper. A separate housekeeper's flat has, therefore, been provided in the basement. It is adequately lighted and satisfactory as a dwelling.



BEFORE CONVERSION



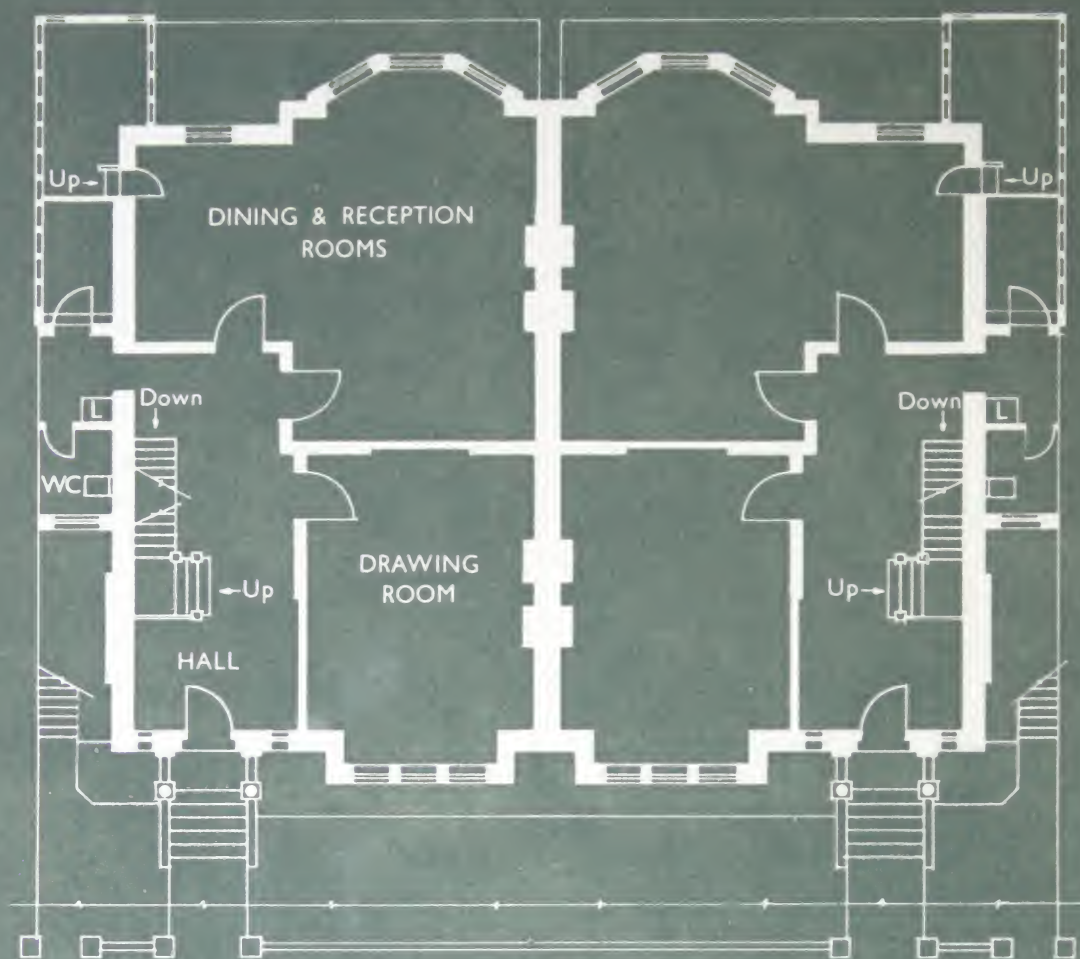
TYPICAL TOWN HOUSE CIRCA 1870



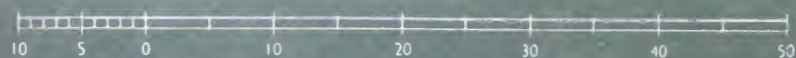
AFTER CONVERSION



TYPICAL TOWN HOUSE CIRCA 1870

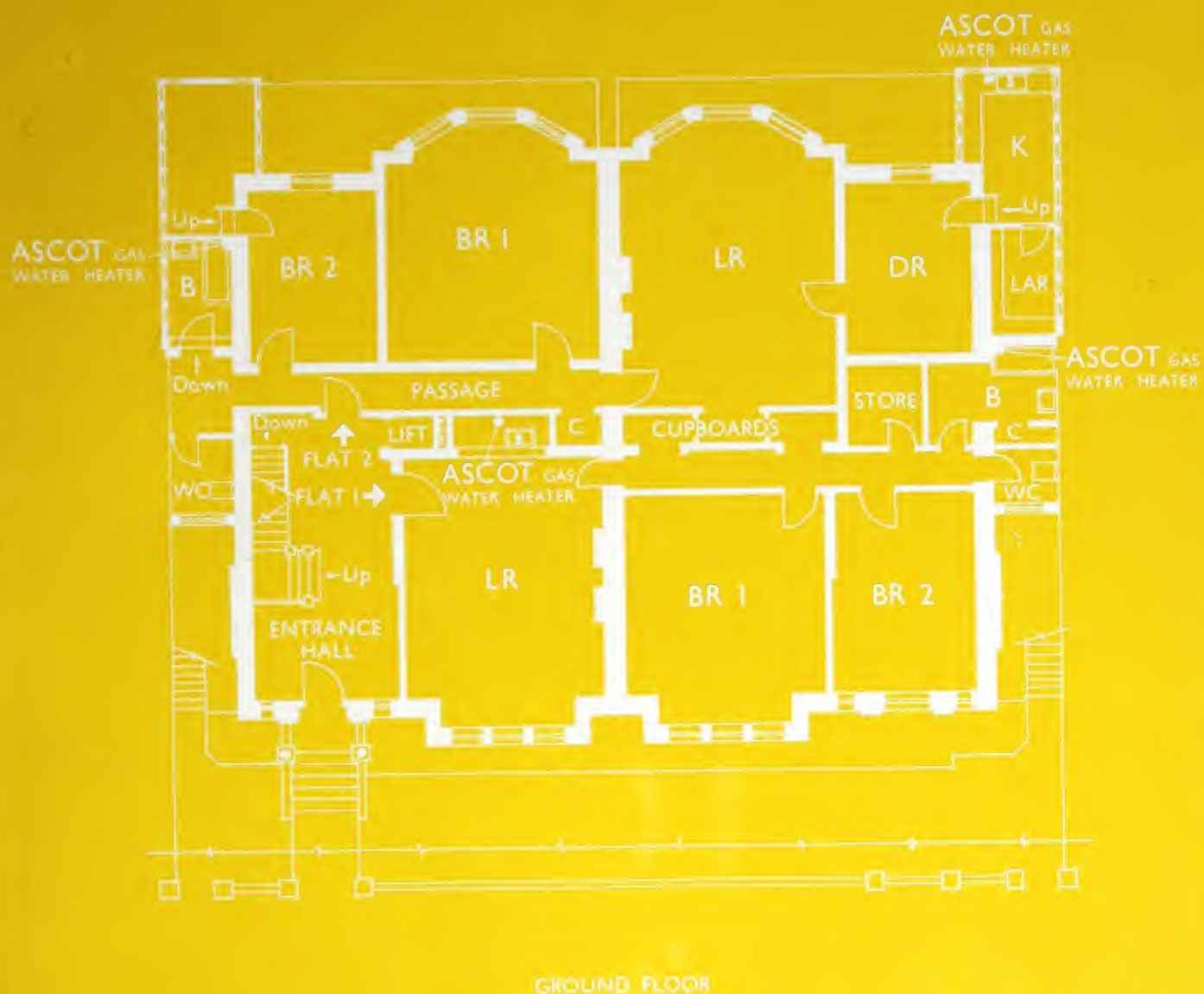


GROUND FLOOR



BEFORE CONVERSION

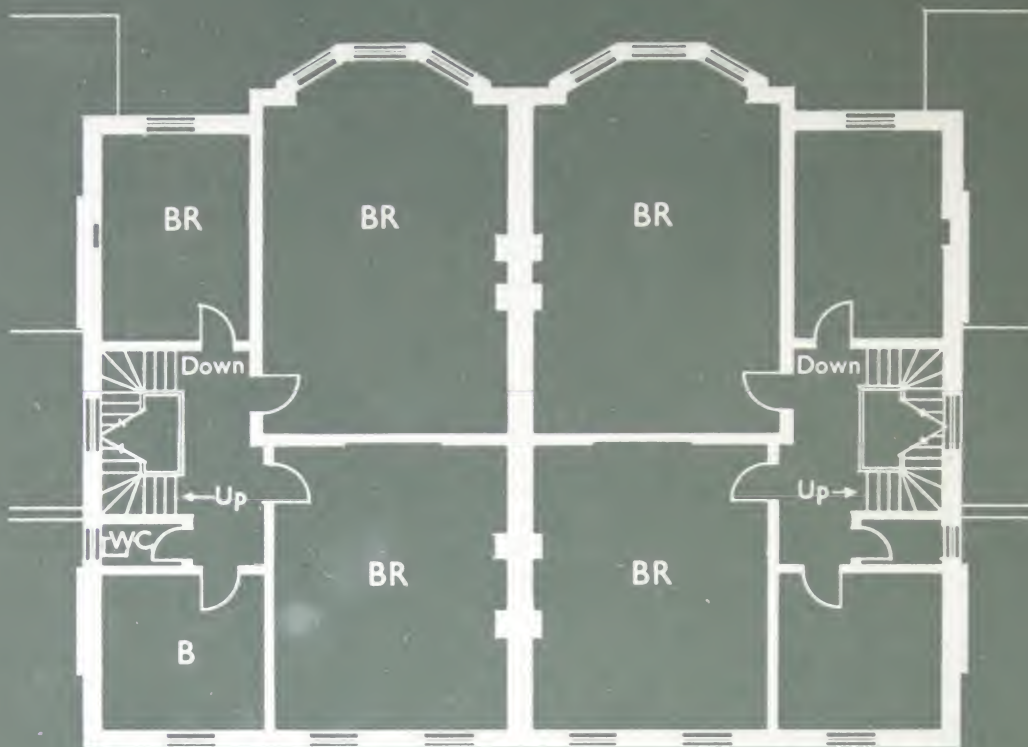
TYPICAL TOWN HOUSE CIRCA 1870



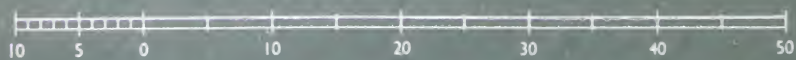
AFTER CONVERSION



TYPICAL TOWN HOUSE CIRCA 1870

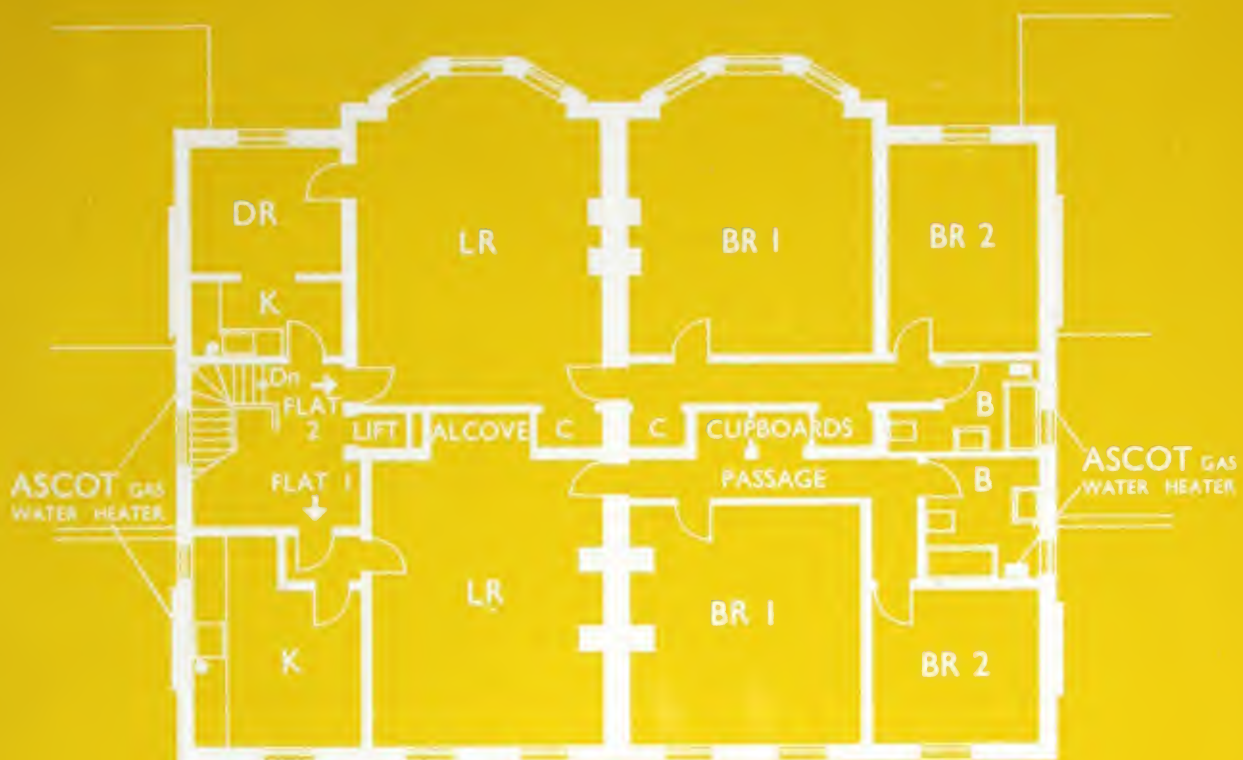


FIRST FLOOR



BEFORE CONVERSION

TYPICAL TOWN HOUSE CIRCA 1870

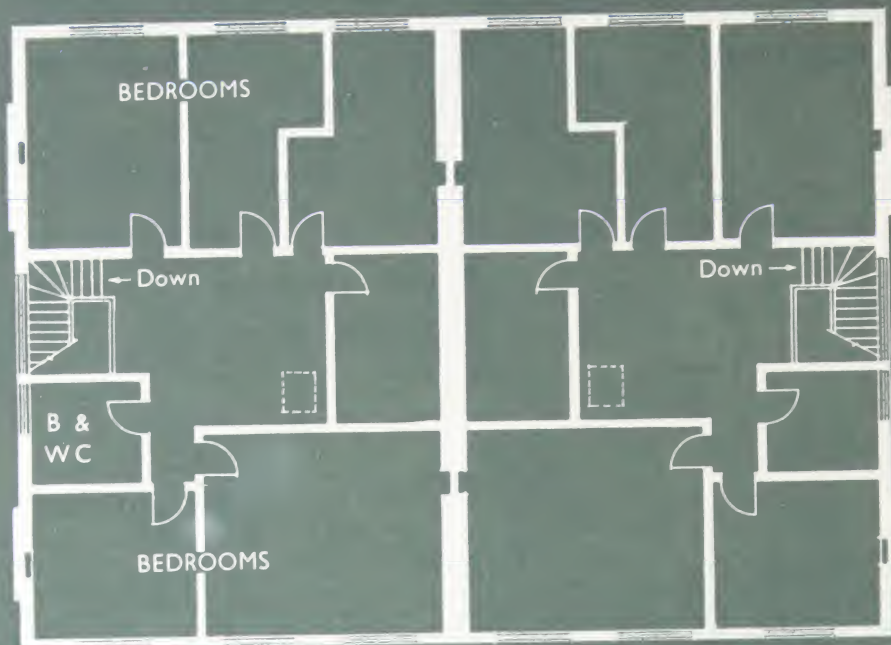


FIRST FLOOR

AFTER CONVERSION

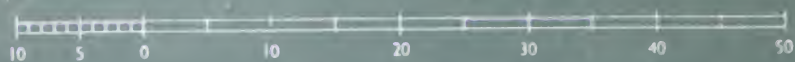


TYPICAL TOWN HOUSE, CIRCA 1870

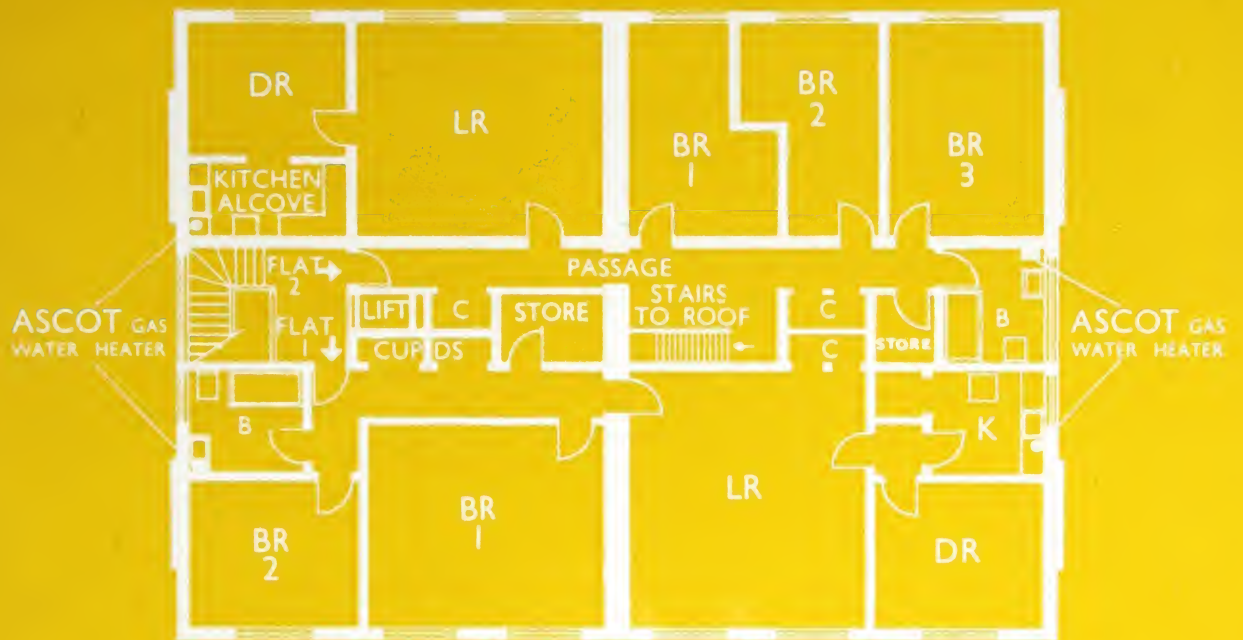


THIRD FLOOR

BEFORE CONVERSION



TYPICAL TOWN HOUSE, CIRCA 1870

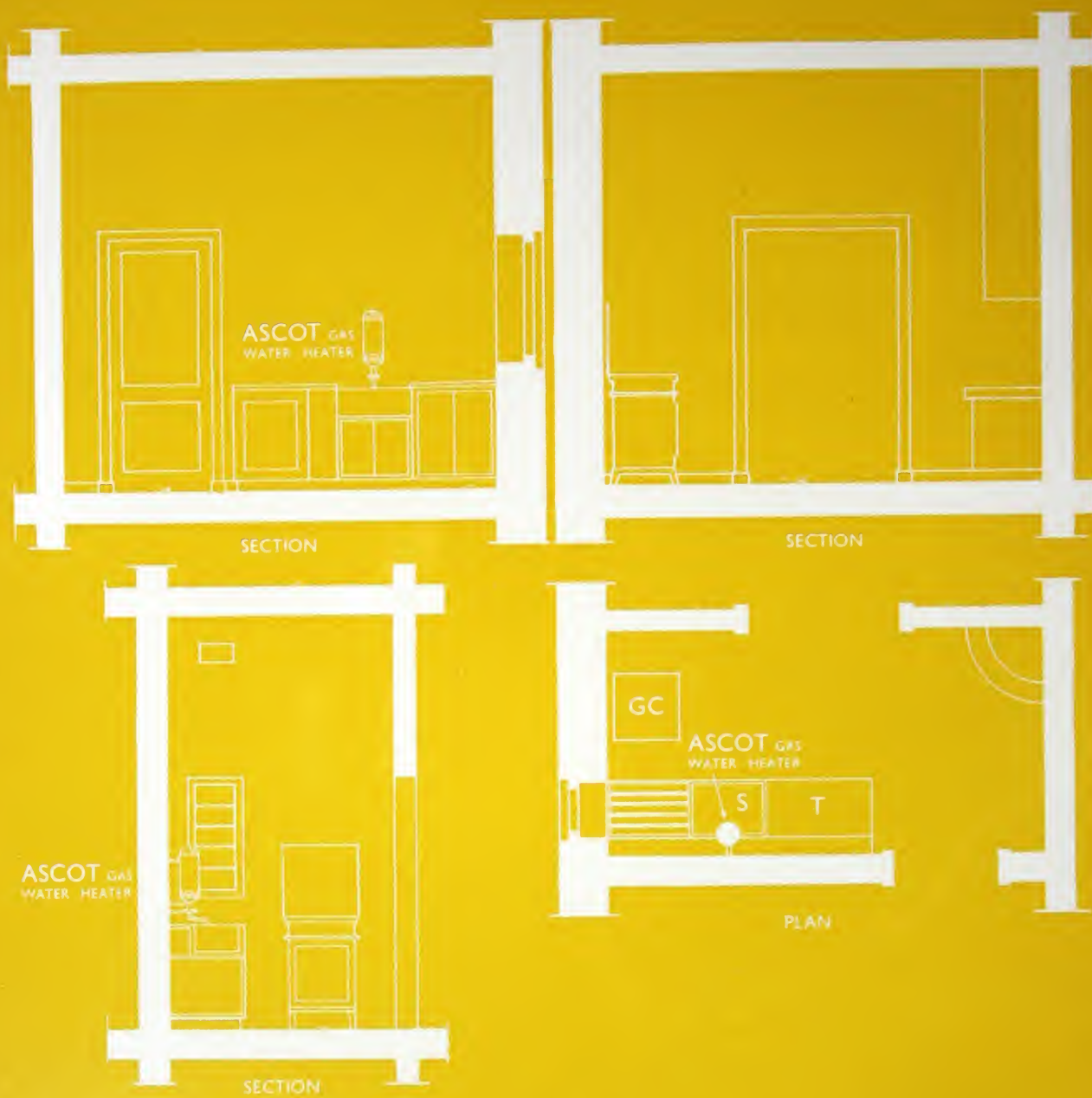


THIRD FLOOR

AFTER CONVERSION



TYPICAL TOWN HOUSE, CIRCA 1870



TYPICAL TOWN HOUSE, CIRCA 1870

# 39 ELM PARK GARDENS, CHELSEA

MESSRS. GEORGE FAIRWEATHER & R. FURNEAUX JORDAN,  
FF.R.I.B.A.



HIS house, a typical mid-nineteenth century product of grey brick and ornate design, is admittedly on the grim side externally. Like many Victorian mansions, however, it is surprisingly light and spacious within. Impossible to maintain to-day as a private house, it lends itself admirably to conversion to modern flats.

The principal rooms provide living accommodation such as cannot be hoped for in a block of modern mansion flats, and the existing smaller rooms—study, dressing-rooms, etc.—convert well to modern bathrooms and kitchens. On the first floor, the inevitable Victorian conservatory has been completely rebuilt as a labour-saving kitchen.

The amount of structural work involved in this conversion was very small compared with the accommodation ultimately gained—five flats and a maisonette—and even under the present stringent conditions a building licence was granted.

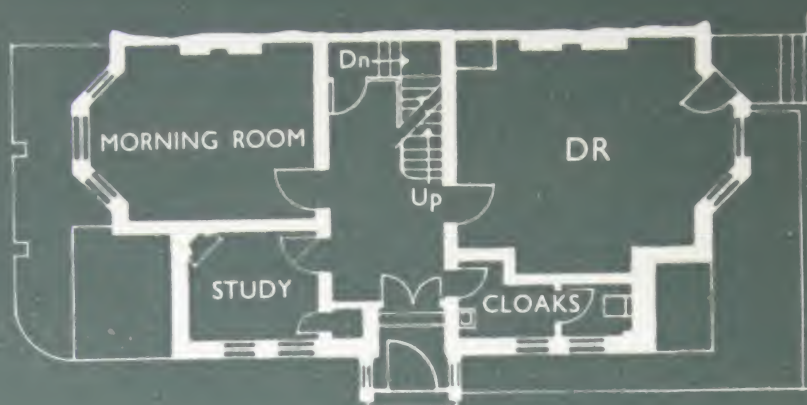
A porter's flat is provided in the basement.

Two self-contained bed-sitting room flats, each with kitchen and bathroom are on the Ground Floor.

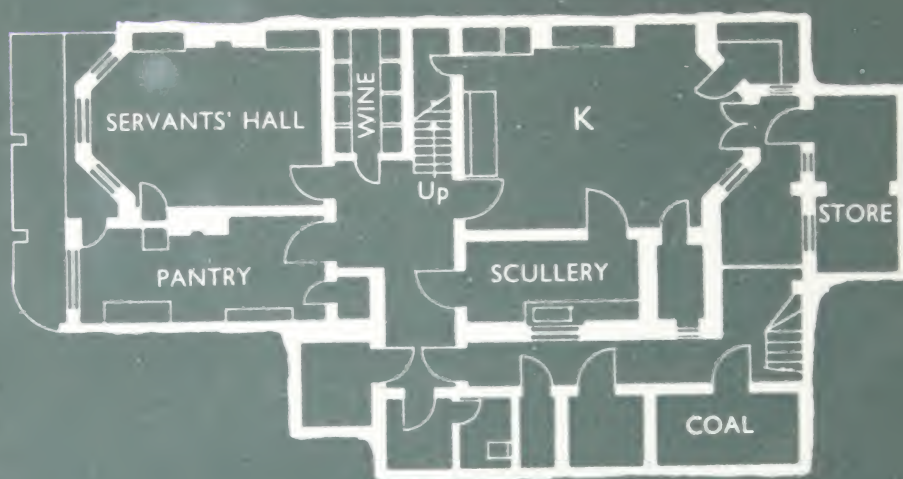
An exceptionally spacious flat with living room, bedroom, etc., is on the First Floor.

A similar flat is provided on the Second Floor.

On the upper floors, a self-contained maisonette with living room, dining room, four bedrooms, kitchen and bathroom is available.



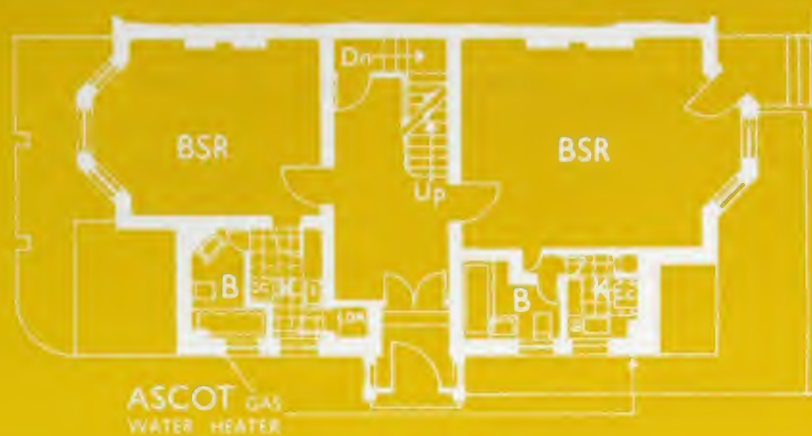
GROUND FLOOR



BASEMENT



BEFORE CONVERSION



GROUND FLOOR

FLATS 1 & 2

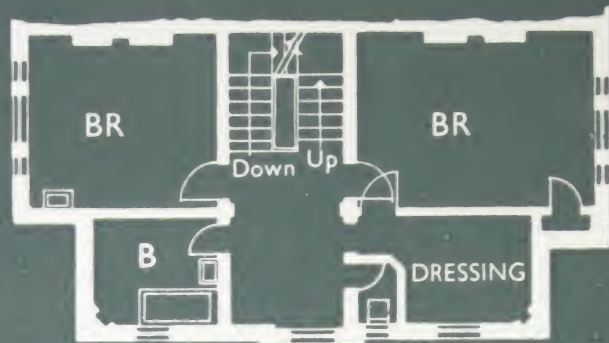


BASEMENT

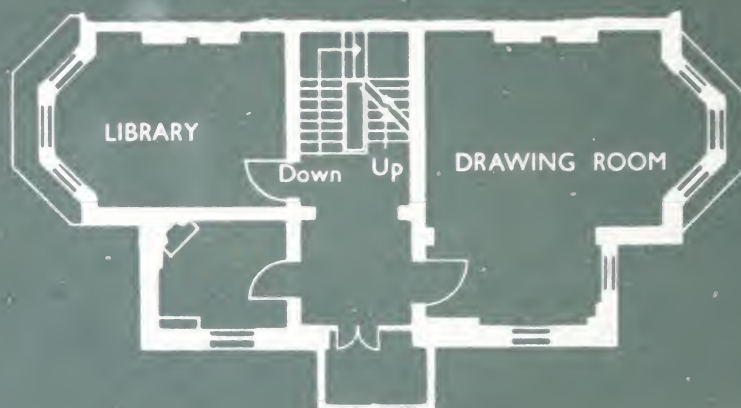
PORTERS' FLAT

AFTER CONVERSION

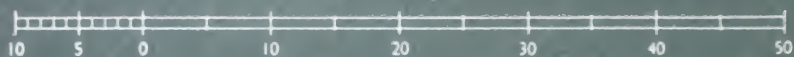




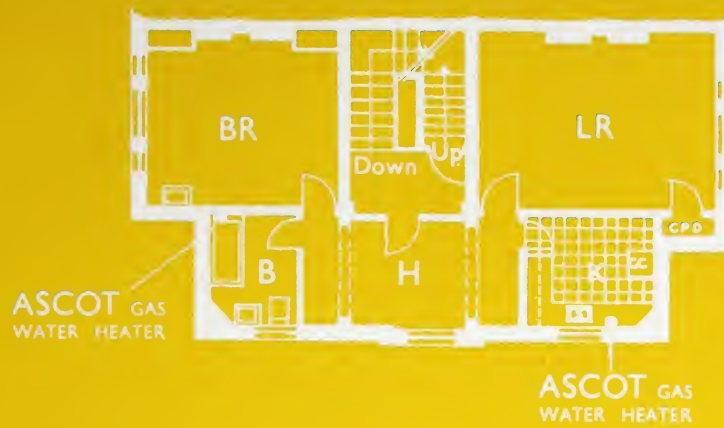
SECOND FLOOR



FIRST FLOOR

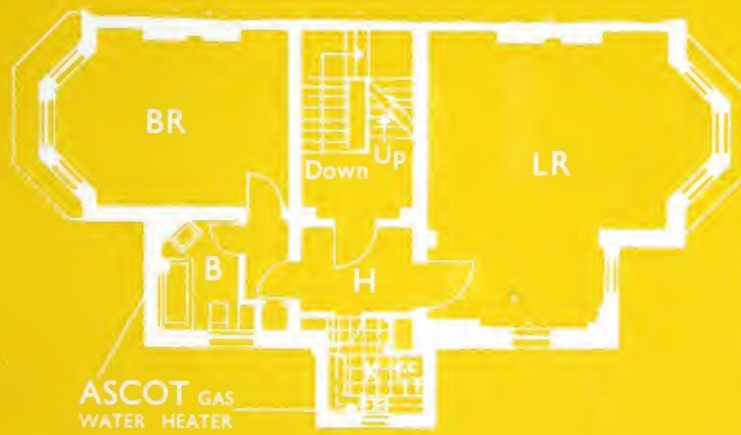


BEFORE CONVERSION



SECOND FLOOR

FLAT 4



FIRST FLOOR

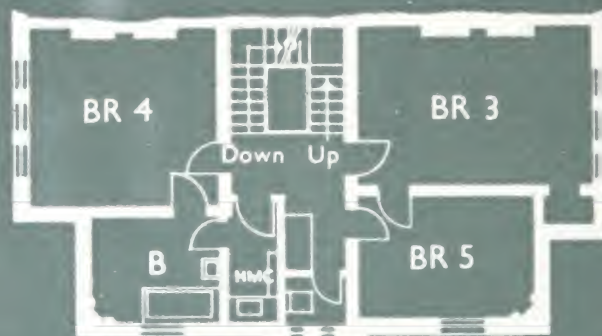
FLAT 3

AFTER CONVERSION





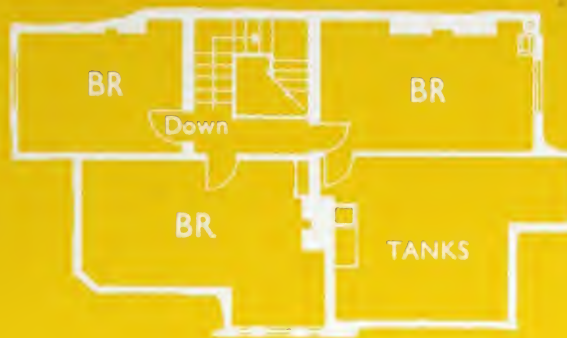
FOURTH FLOOR



THIRD FLOOR



BEFORE CONVERSION



FOURTH FLOOR  
MAISONETTE UPPER PART



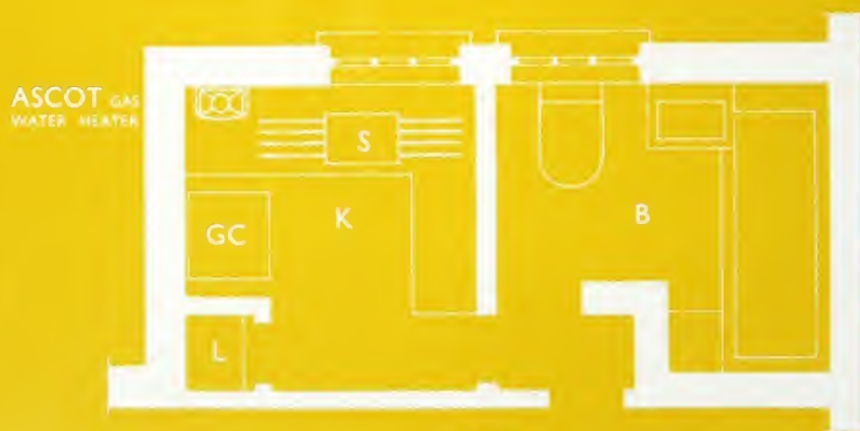
THIRD FLOOR  
MAISONETTE LOWER PART

AFTER CONVERSION





SECTION THROUGH KITCHEN & BATHROOM



PLAN



# A HOUSE IN HAMPSTEAD

ERNST L. FREUD



THE house is situated in the Belsize Park District of Hampstead. It is detached, has a nice garden in the rear, is well built and dates from the second half of the 19th century.

It is a leasehold with a lease of 60 years at a ground rent of £90 p.a.

The premium for the lease was . . . . . £1,300  
and the cost of conversion at an average expenditure of £500 per unit will amount to 3,000  
In addition for fees, legal expenses, etc., an amount of . . . . . 400  
has to be allowed

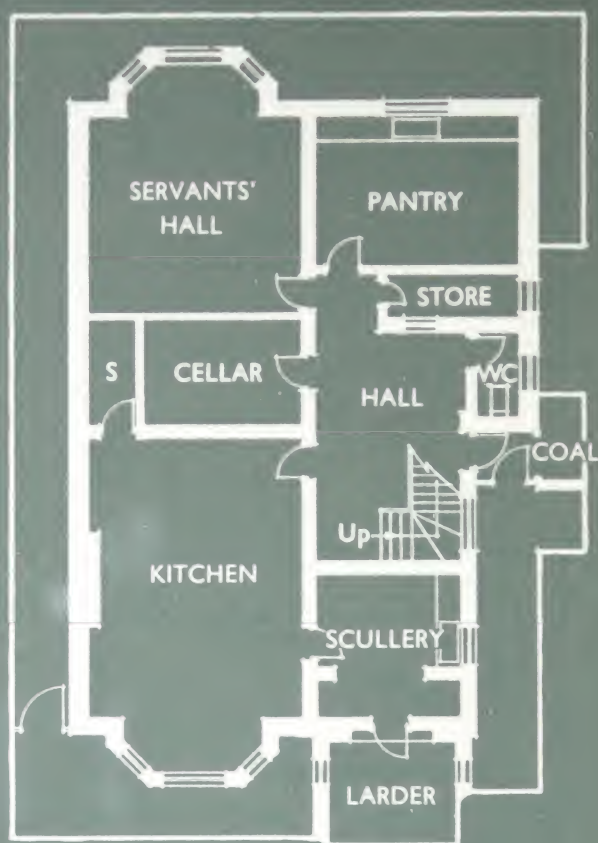
making a total capital expenditure of . . . . . £4,700

The inclusive rents are as follows :

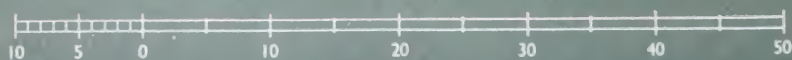
Basement Flat A . . . . .	£100
Garden Flat B . . . . .	250
First Floor Flat C . . . . .	180
First Floor Flat D . . . . .	170
Second Floor Flat E . . . . .	160
Second and Third Floor Maisonnette F . . . . .	220
<hr/>	
Total gross rents . . . . .	£1,080
Outgoing taxes, rates, etc. 40 per cent. . . . .	430
<hr/>	
Net income . . . . .	£650
Less ground rent . . . . .	90
<hr/>	
Leaves . . . . .	£560

This amount of £560 will be sufficient to cover amortisation of invested capital and will show a return of about 10 per cent.

Each flat is absolutely self contained. For heating purposes one open fireplace with a gas point is provided in the living room of each flat, and there are electric power points in all rooms. Hot water is provided independently for each flat by Ascot gas water heaters; the multi-point type is used where bathroom and kitchen are near one another ; where the distance between the two is greater, a bath water heater is installed in the bathroom and a sink water heater in the kitchen.



BASEMENT



BEFORE CONVERSION

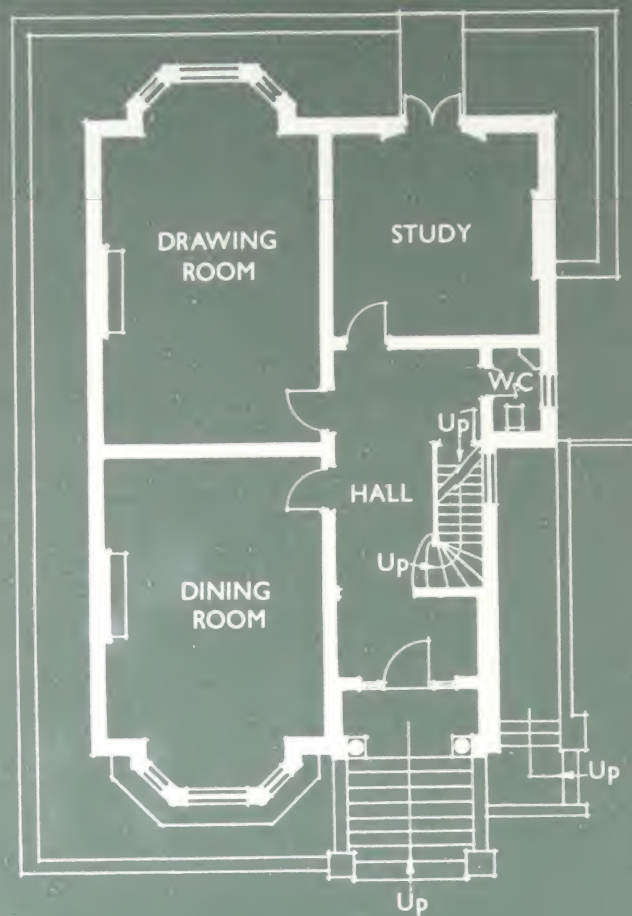


FLAT A

BASEMENT

AFTER CONVERSION

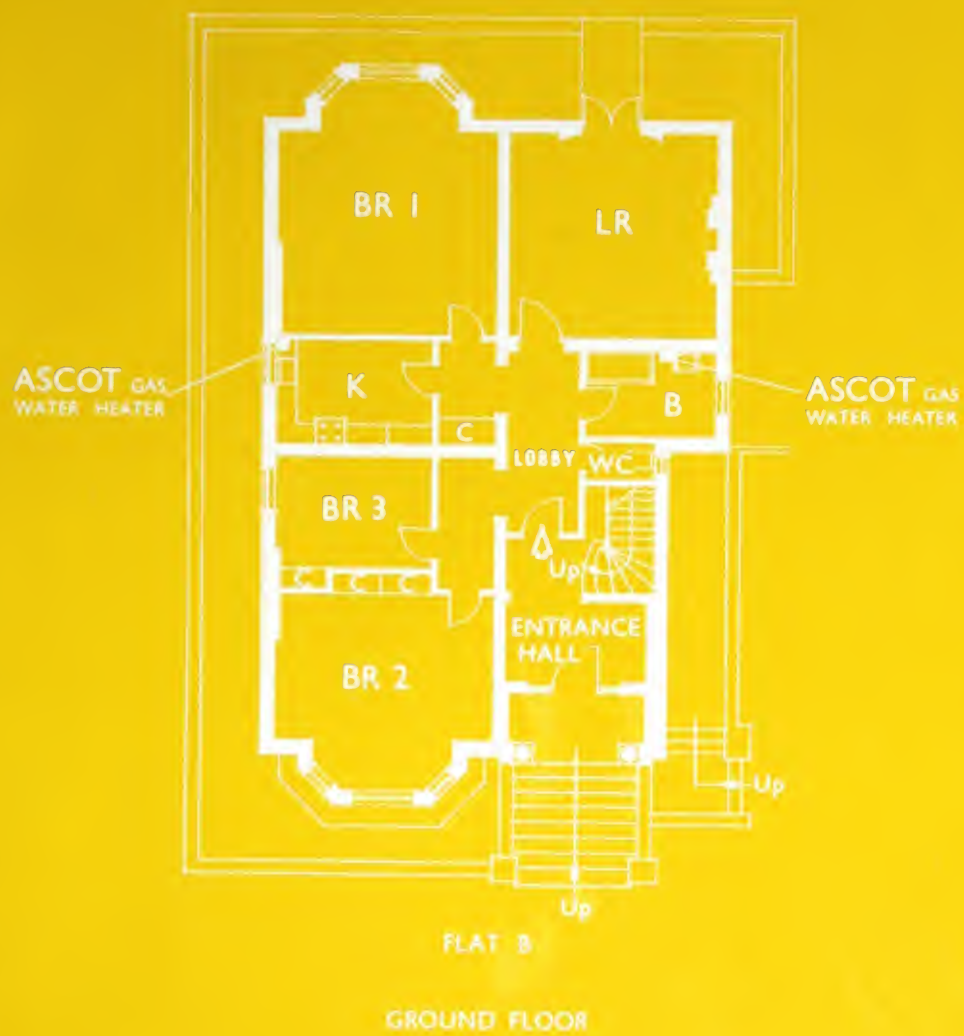




GROUND FLOOR

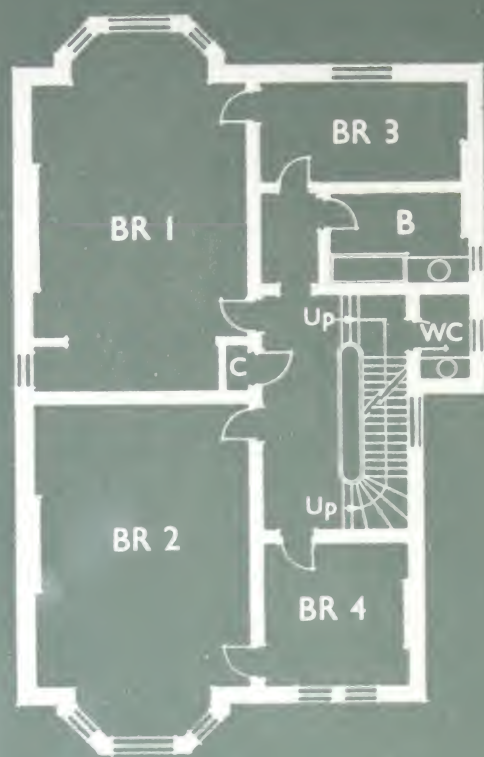


BEFORE CONVERSION



AFTER CONVERSION

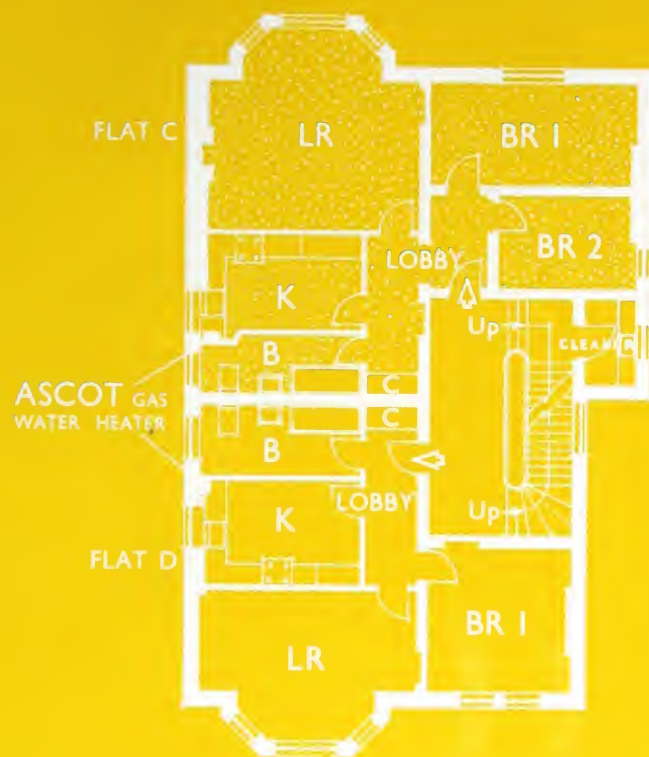




FIRST FLOOR

BEFORE CONVERSION

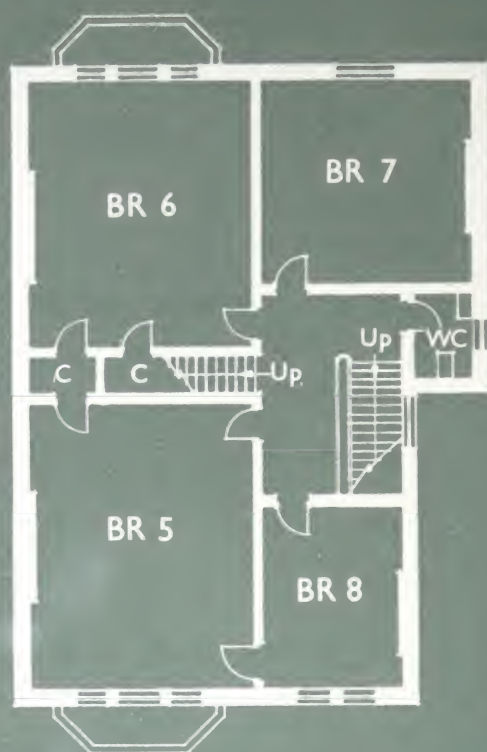




FIRST FLOOR

AFTER CONVERSION





SECOND FLOOR

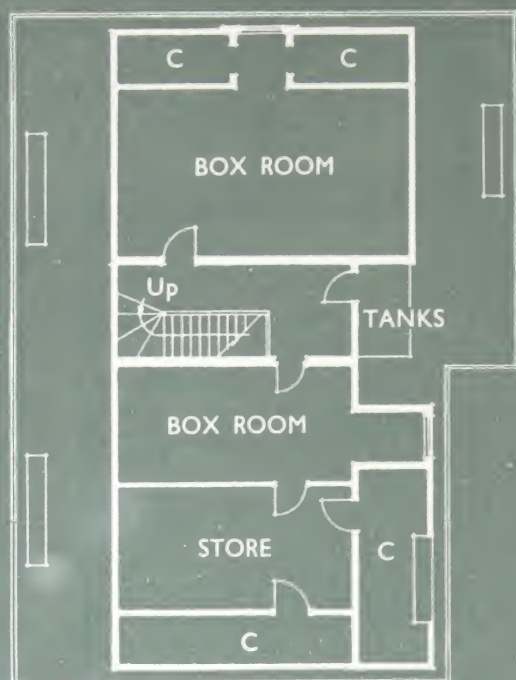


BEFORE CONVERSION

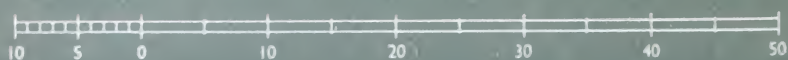


AFTER CONVERSION

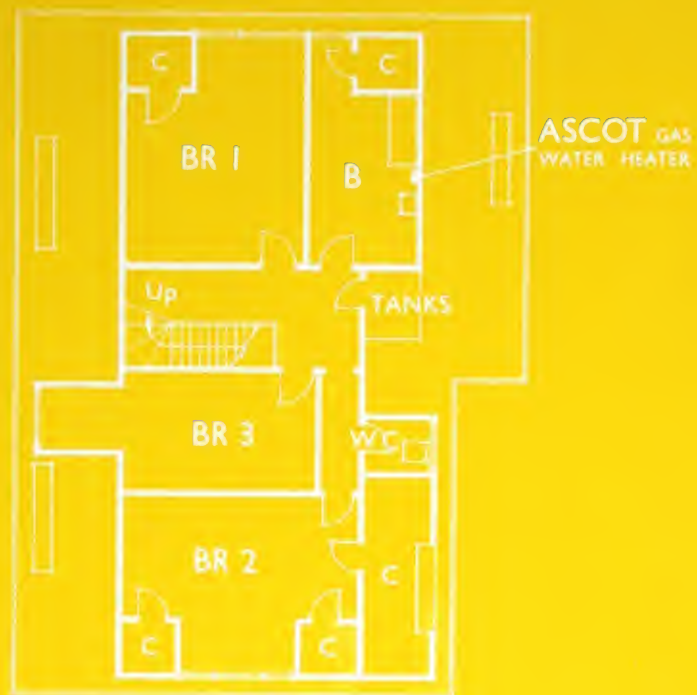




THIRD FLOOR



BEFORE CONVERSION

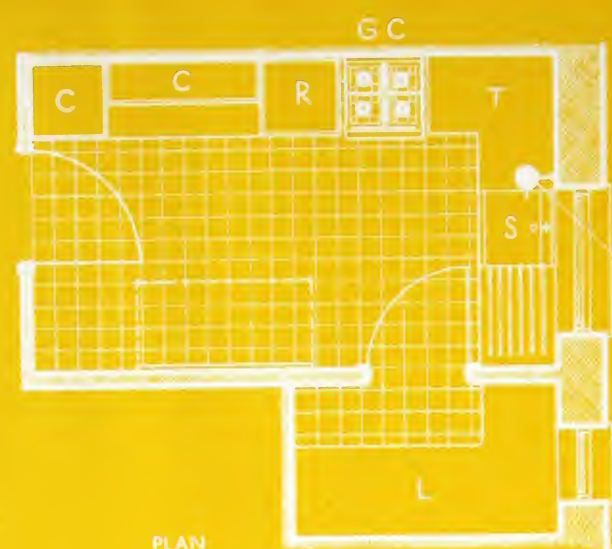


MAISONETTE F

THIRD FLOOR

AFTER CONVERSION





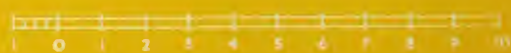
ASCOT GAS  
WATER HEATER



SECTION



SECTION



# CONVERSIONS AT WARWICK WAY AND SUTHERLAND TERRACE, S.W.I

ALBERT J. THOMAS, F.R.I.B.A., M.I.Struct.E.



HIS scheme comprises a terrace of fifteen large early Victorian houses in Warwick Way and two on the return in Sutherland Avenue, with a public house intervening at the corner. The houses, which have portico-entrances, were severely damaged by enemy action, and before the conversions could be started very extensive repairs had to be carried out, including some rebuilding of upper portions in brickwork and the provision of new roofs. In addition, the road rises gradually from one end of the terrace to the other, and this had to be allowed for in planning the conversions.

It is not present policy to allow basements to be used for sleeping quarters, so in all cases the basements and ground floors together have been planned as maisonettes, with living-room, kitchen, bathroom and W.C. in the basement, and three bedrooms above on the ground-floor. The entrance to each maisonette is in the basement.

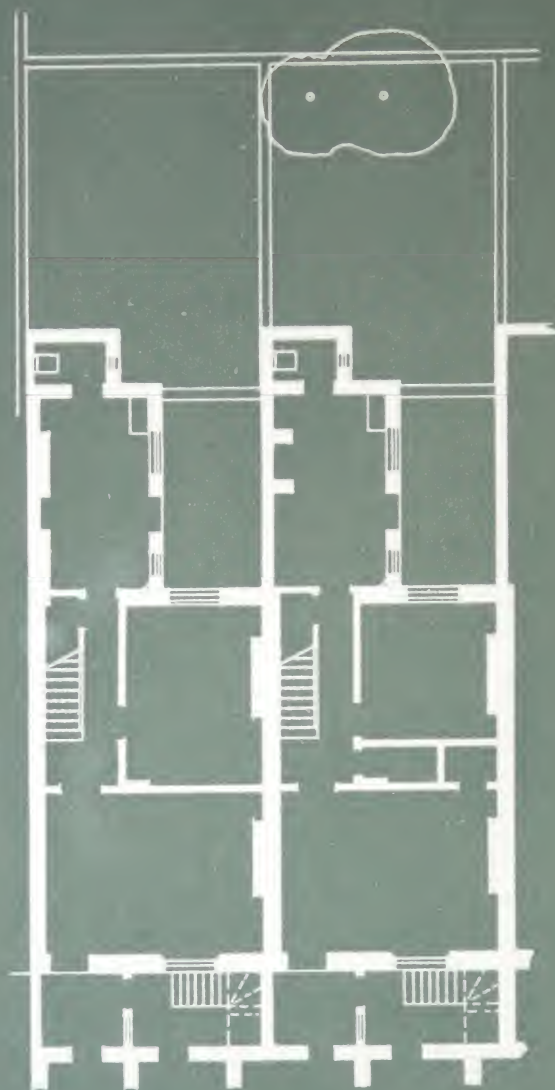
Under Public Health Regulations applying to inhabited rooms, certain alterations had to be done to the basements. Partitions were erected to form a passage from the entrance, and these were glazed with fire-proof glazing to assist in lighting the living-rooms. In many cases windows had to be enlarged, to comply with the regulation under which the amount of lighting is determined by the area of the room.

In all cases the second and third floors have also been converted into maisonettes. Each is entirely self-contained, the necessary partitions (to staircases, etc.) having been constructed to effect this. In eight of the houses it has been possible, by making an opening in the party-wall, to treat the first floors in pairs, thus making a large flat of each pair, consisting of entrance-hall, living-room, kitchen, three bedrooms, bathroom and W.C. But in the case of the others, the rise in the road and the differences in levels made this impracticable. It was, therefore, necessary to make the first floor in each of these houses into a single small flat, consisting of living-room, bedroom, kitchen, bathroom and W.C.

Each flat or maisonette has its own electrical installation and meter. Moreover, to provide each tenant with his own instant hot water-service, Ascot Multipoint Water-Heaters have been fitted throughout. In most cases this Heater serves the bath, wash-basin and sink, but where the distance makes this impracticable a separate small Ascot Heater has been installed over the sink, the larger Multipoint serving only the bath and wash-basin.

Every kitchen has a newly-constructed and well-ventilated larder, a gas-cooker, a clothes-airer suspended from the ceiling, an electric point for iron, etc., and a sink with a double draining board. And all bathrooms are fitted with wash-basins.

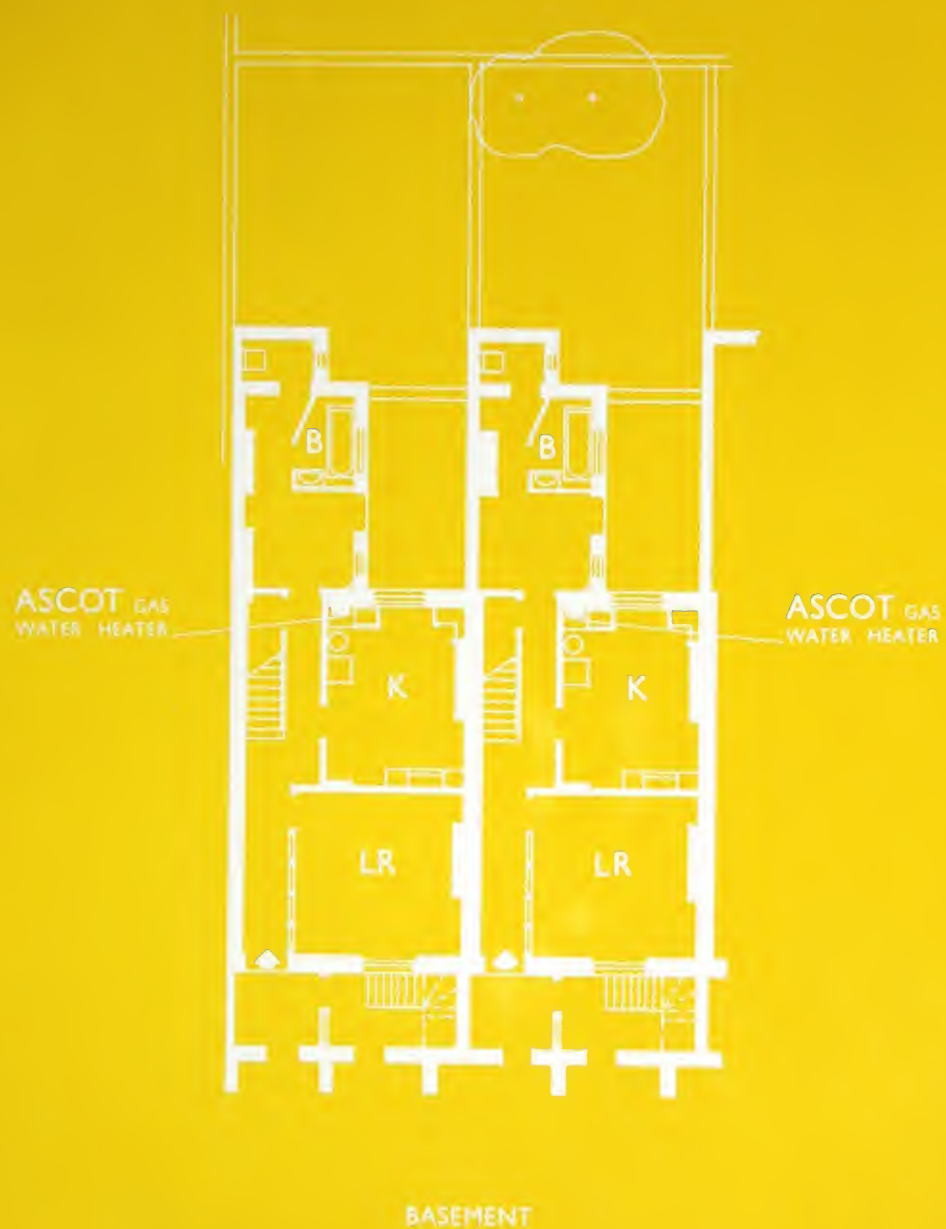
The flats have been entirely redecorated throughout, and now provide good homes for forty-four families, with the further assurance of a much longer life for the premises.



BASEMENT



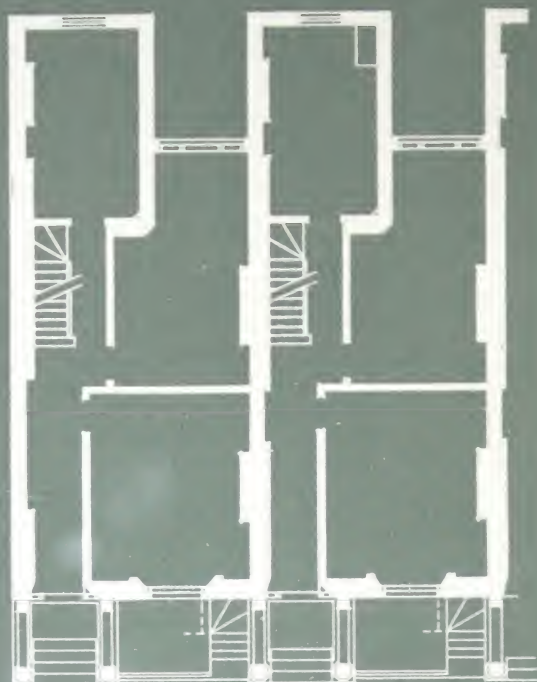
BEFORE CONVERSION



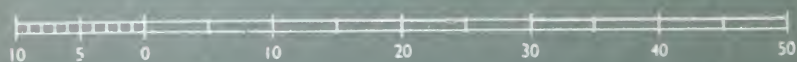
AFTER CONVERSION



CONVERSIONS AT WARWICK WAY AND SUTHERLAND TERRACE, S.W.1

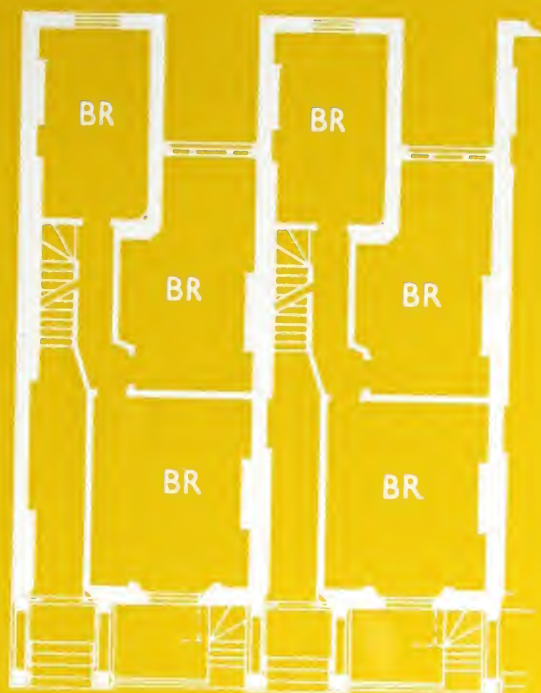


GROUND FLOOR



BEFORE CONVERSION

CONVERSIONS AT WARWICK WAY AND SUTHERLAND TERRACE, S.W.1

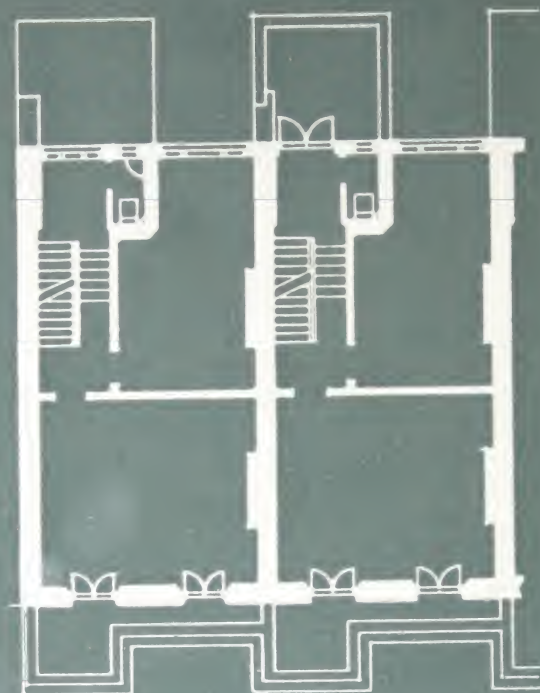


GROUND FLOOR

AFTER CONVERSION



CONVERSIONS AT WARWICK WAY AND SUTHERLAND TERRACE, S.W. I

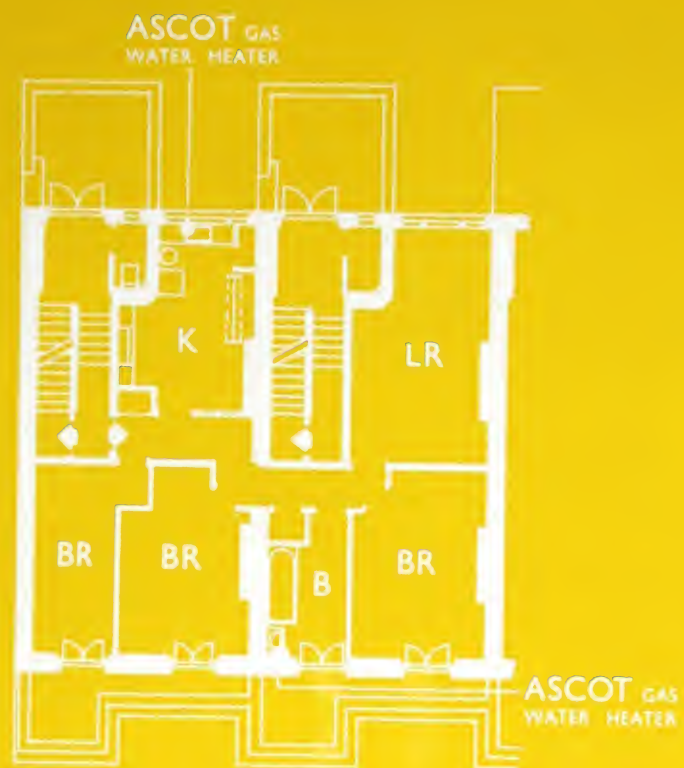


FIRST FLOOR



BEFORE CONVERSION

CONVERSIONS AT WARWICK WAY AND SUTHERLAND TERRACE, S.W. I

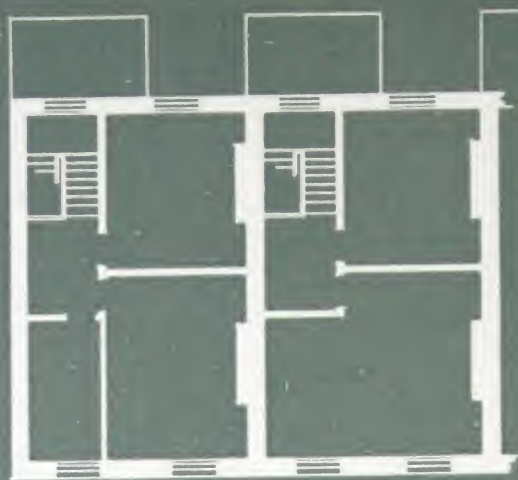


FIRST FLOOR

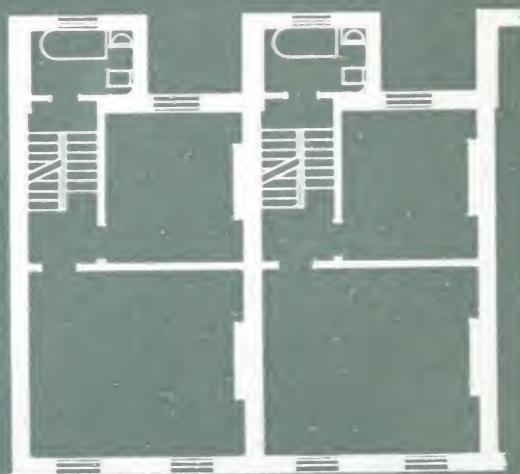
AFTER CONVERSION



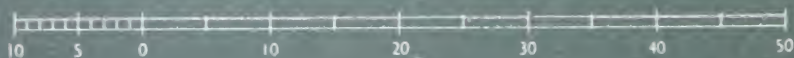
CONVERSIONS AT WARWICK WAY AND SUTHERLAND TERRACE, S.W.1



THIRD FLOOR



SECOND FLOOR



BEFORE CONVERSION

CONVERSIONS AT WARWICK WAY AND SUTHERLAND TERRACE, S.W.1



THIRD FLOOR

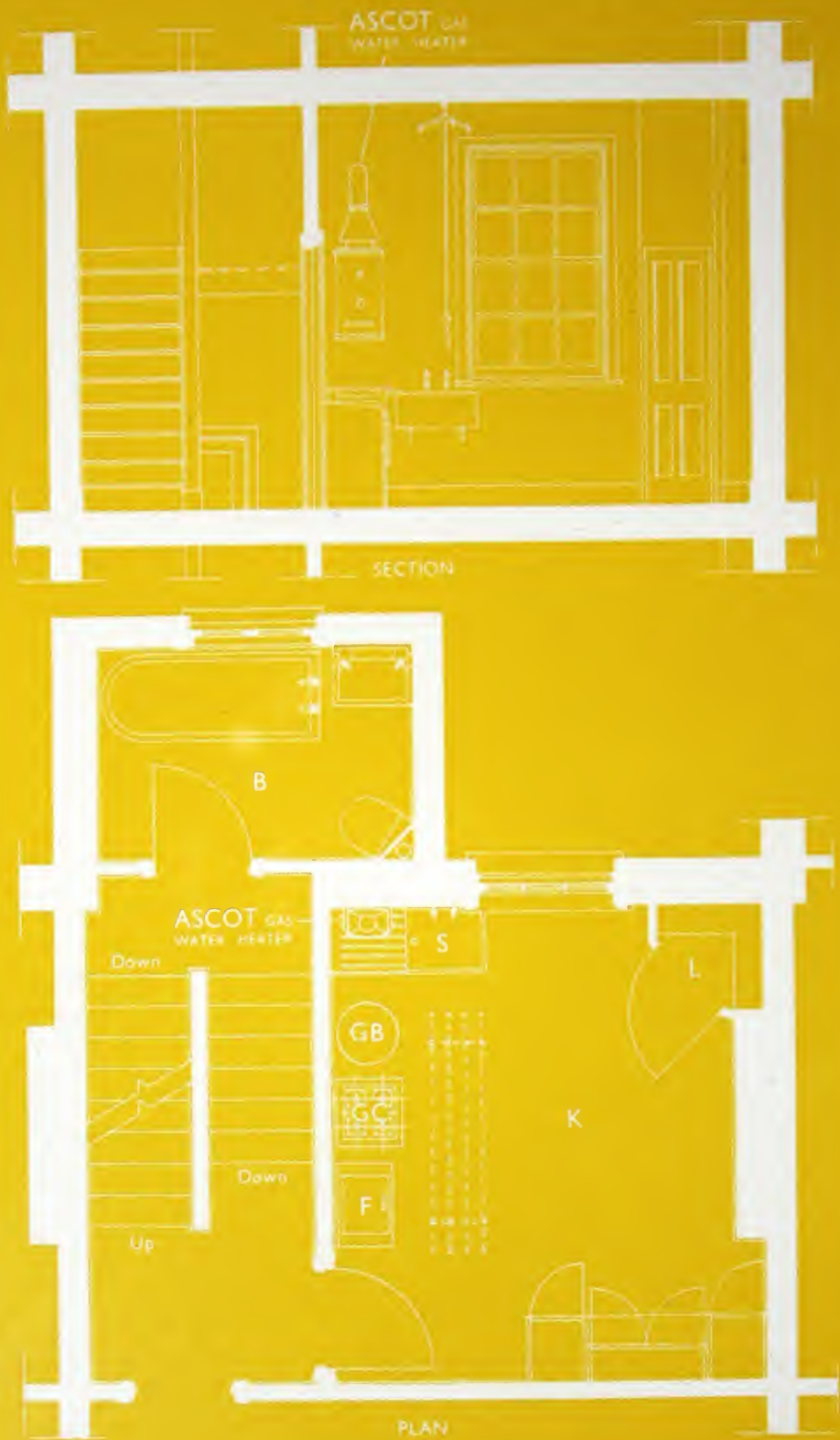


SECOND FLOOR

AFTER CONVERSION



CONVERSIONS AT WARWICK WAY AND SUTHERLAND TERRACE, S.W.1



CONVERSIONS AT WARWICK WAY AND SUTHERLAND TERRACE, S.W.1

# DETACHED TWO-STOREY SUBURBAN VILLA

ALMA J. DICKER, A.R.I.B.A.



THE conversion of a two-storey detached villa into two self-contained flats is governed by the position of the staircase. It is not economical to move the staircase, but some alteration is usually necessary.

In this scheme the alteration consists of turning the bottom three steps round 90 degrees and the addition of a quarter space landing. A new wall across the back of the existing hall separates the staircase from the remainder of the ground floor and forms an entrance hall to the upper flat, with space for a pram if required.

An entrance hall to the lower flat is provided by cutting off part of the existing kitchen. The doors into the living room are glazed and this, together with a glazed panel in the entrance door and borrowed light from the kitchen and bedrooms, affords adequate lighting to the circulation space of the flat.

The accommodation in both these flats is the same—a living room, three bedrooms, kitchen and bathroom.

The Cozy slow combustion stove in the existing dining room, which provided hot water when the house was occupied by one family, will be replaced by an open fire now that the room is to be used as a living room. The living room in the upper flat will also have an open fire, but the bedrooms in both cases will be heated by gas fires where flues are available.

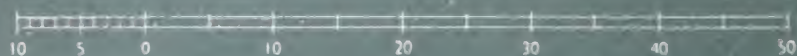
A Multi-point Ascot gas water heater in each kitchen supplies hot water to the sink, bath and lavatory basin.



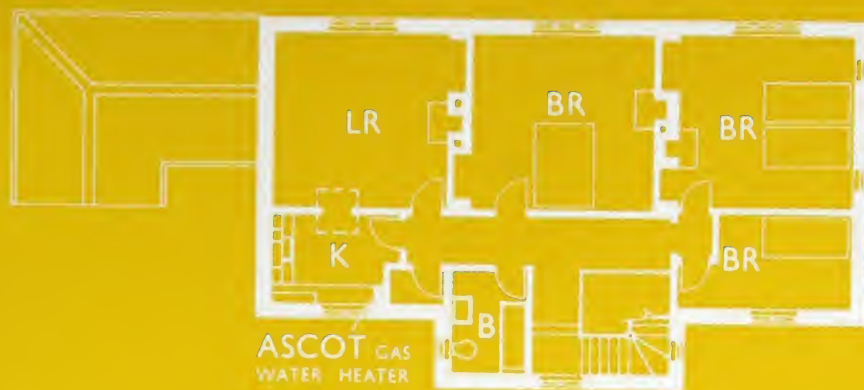
FIRST FLOOR



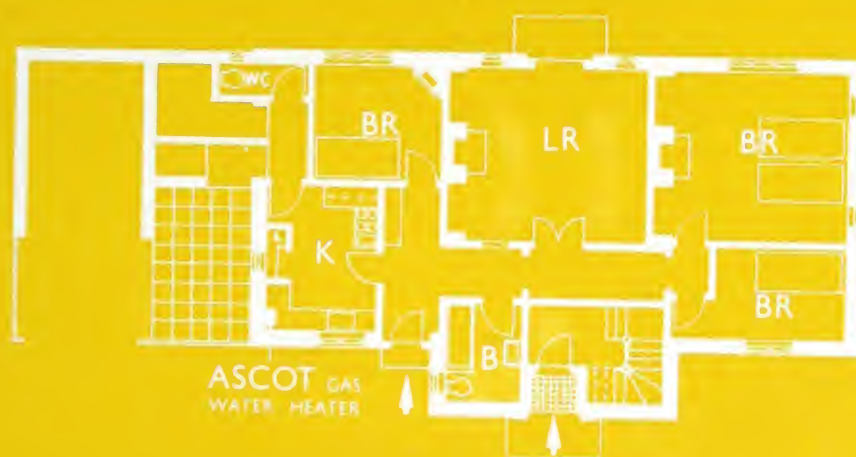
GROUND FLOOR



BEFORE CONVERSION



FIRST FLOOR



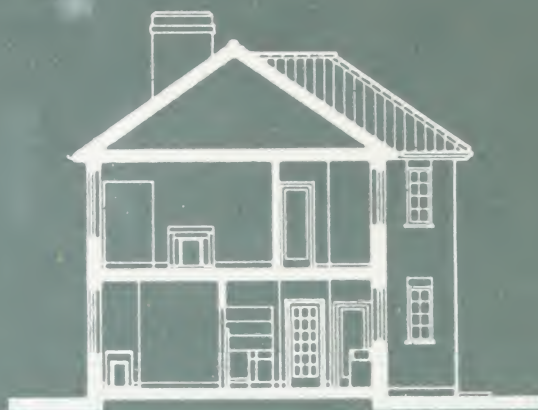
GROUND FLOOR

AFTER CONVERSION

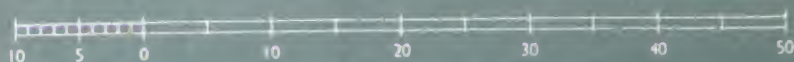




ELEVATION



SECTION



BEFORE CONVERSION

DETACHED TWO-STOREY SUBURBAN VILLA



ELEVATION

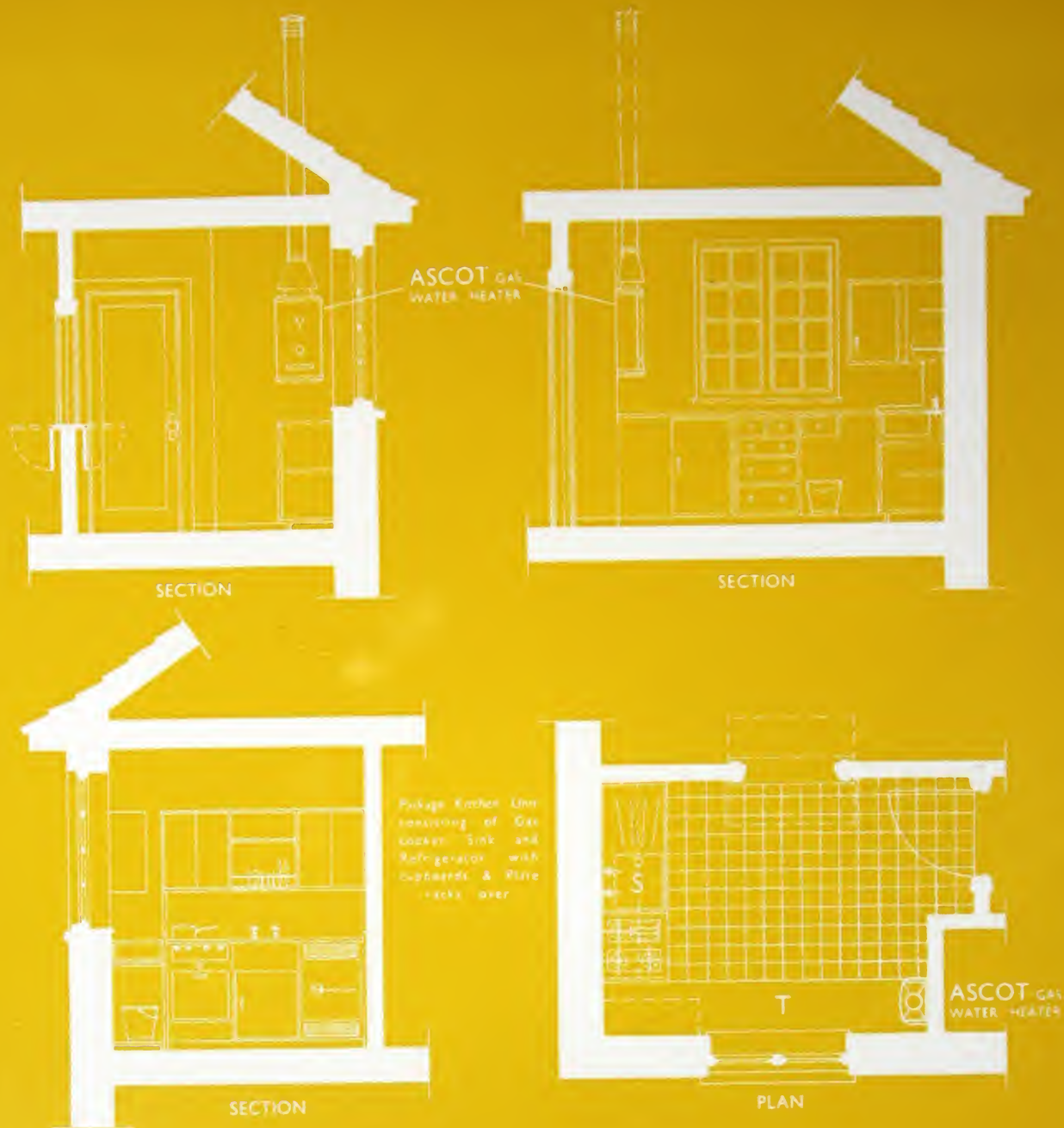


SECTION

AFTER CONVERSION



DETACHED TWO-STOREY SUBURBAN VILLA



DETACHED TWO-STOREY SUBURBAN VILLA

# A STUDENTS' HOSTEL

L. H. BUCKNELL, F.R.I.B.A. and RUTH ELLIS, A.R.I.B.A.



THE five end houses of a terrace have been chosen for conversion to a Students' Hostel. The frontage is to a main road ; there is a service road (mews) at the back and a side road connecting the two. The ground floor level is slightly above the level of the main road and the mews is at the level of the lower ground floor or basement.

The houses are of the smaller "Georgian" type, common in Bloomsbury, and lend themselves to this type of conversion.

## ACCOMMODATION

### C. LOWER GROUND FLOOR

Ante and coffee room, dining rooms, kitchens, etc.

Garden with service from kitchen.

Squash rackets court.

9 Lock-up garages available for the Hostel or for separate letting.

### D. GROUND FLOOR

Entrance lounge, manageress' office, telephone, etc.

Games rooms, library, etc.

Bedrooms (see E).

### E. GROUND AND UPPER FLOORS

#### GROUND FLOOR

9 Study bedrooms.

Cook's room.

Accommodation for 5 resident staff.

#### FIRST FLOOR

23 Study bedrooms.

Bed-sitting room for manageress.

#### SECOND FLOOR

25 Study bedrooms.

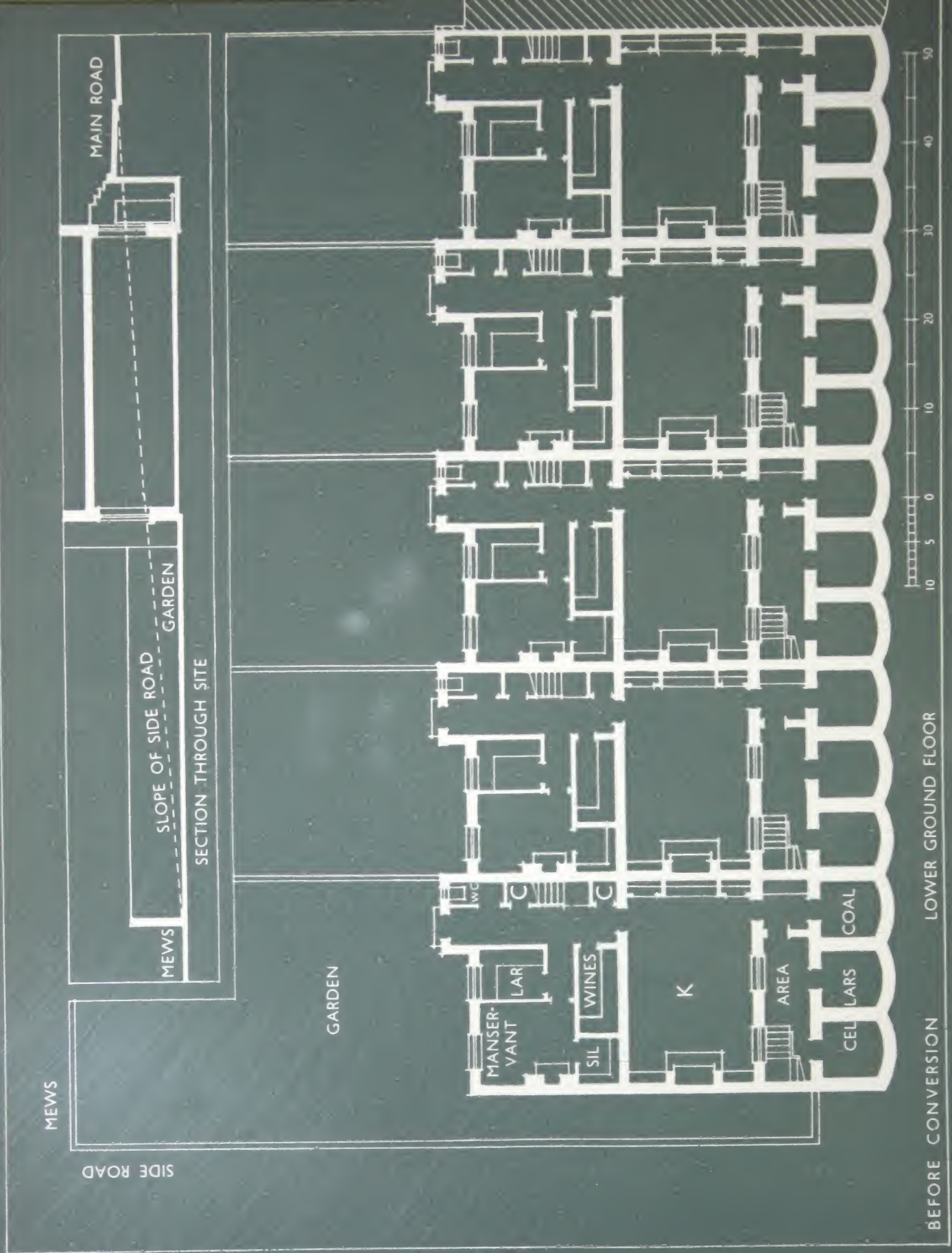
#### THIRD FLOOR

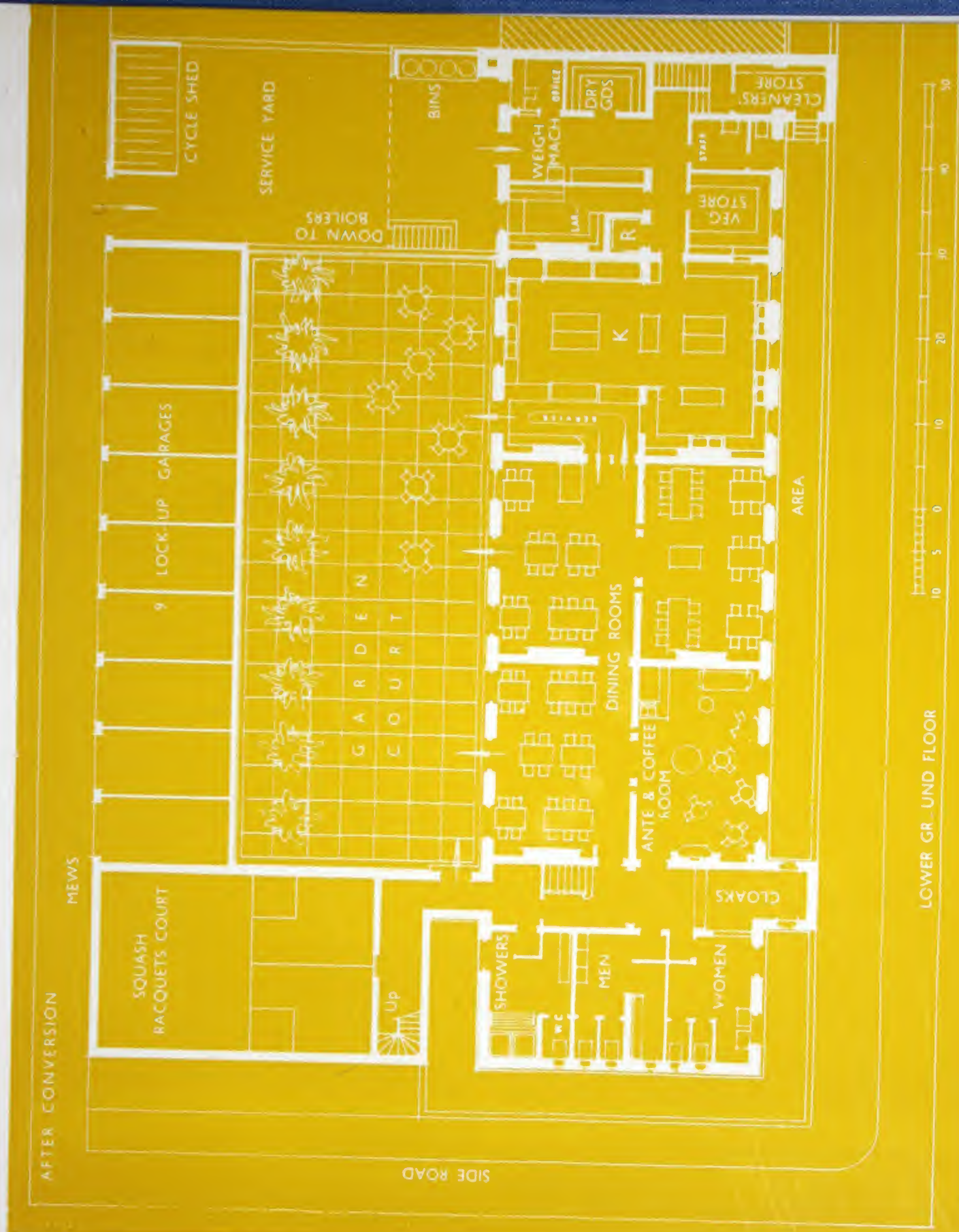
25 Study bedrooms.

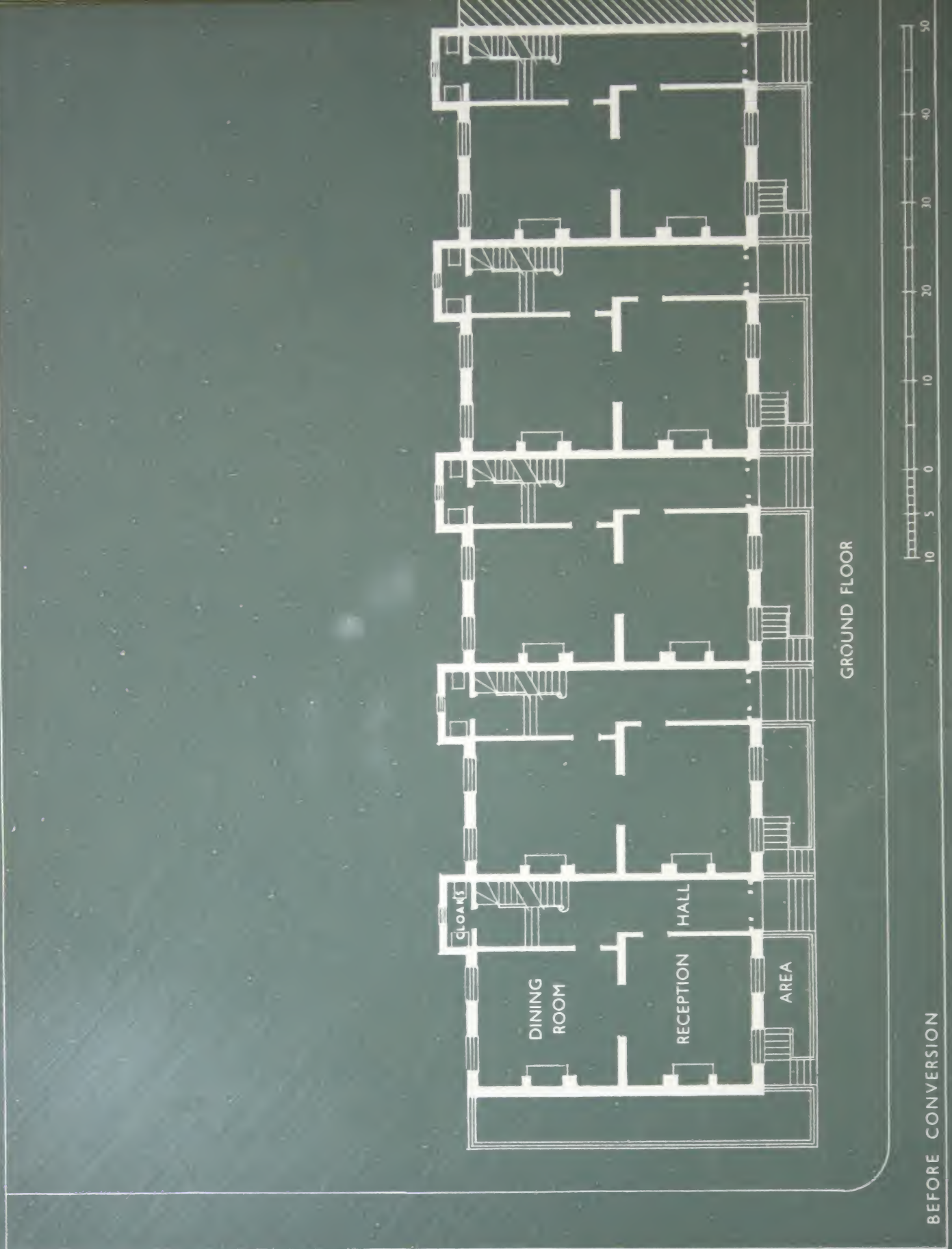
#### TOTAL

82 Study bedrooms.

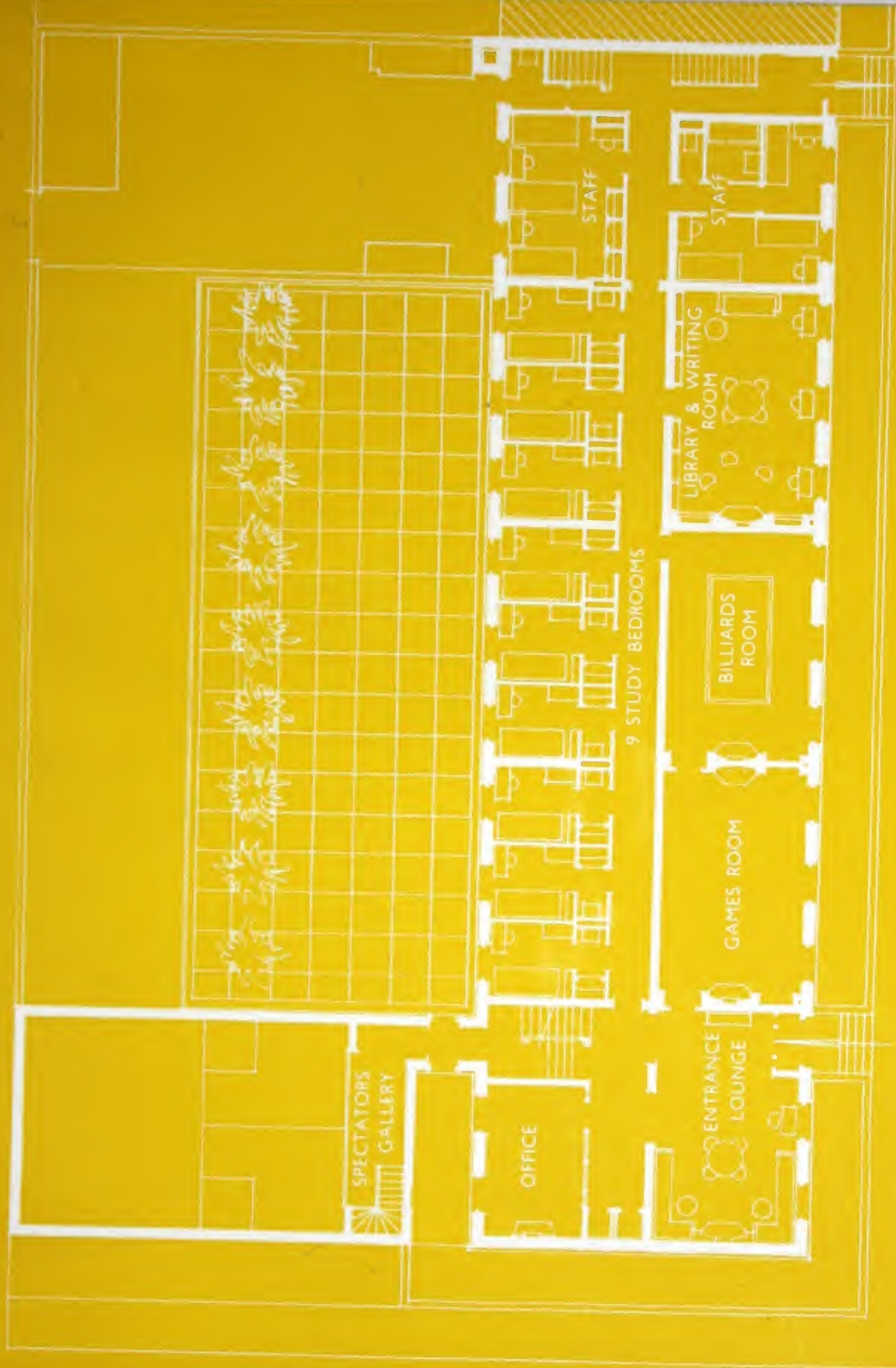
7 Resident staff.







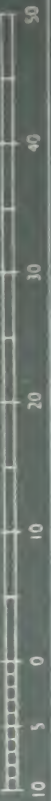
AFTER CONVERSION



GROUND FLOOR

MAIN ROAD

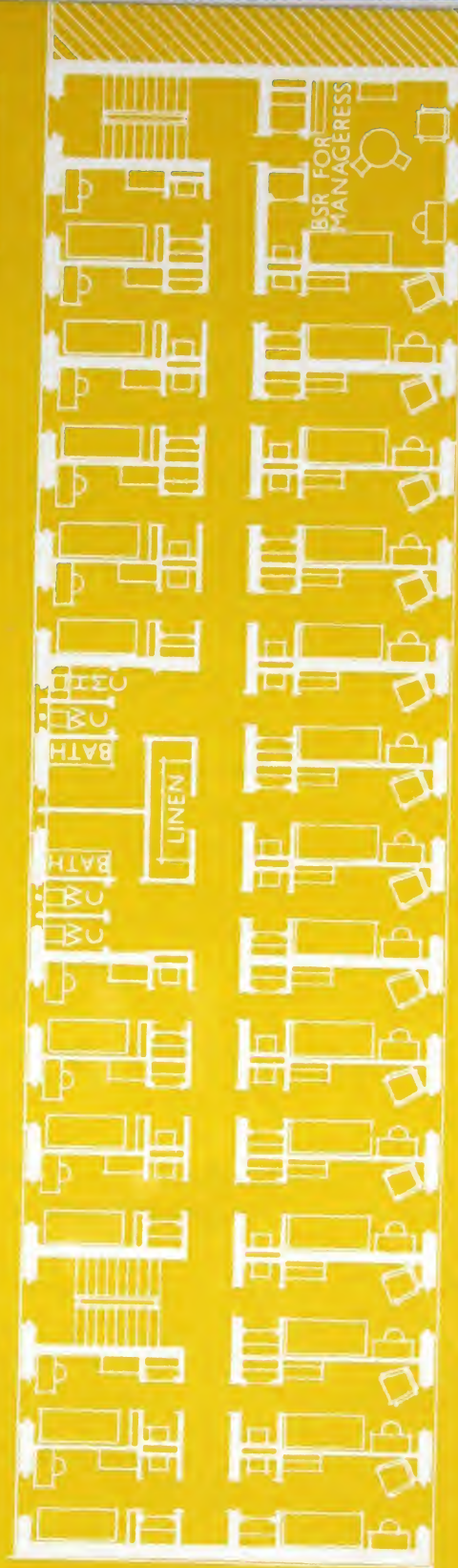
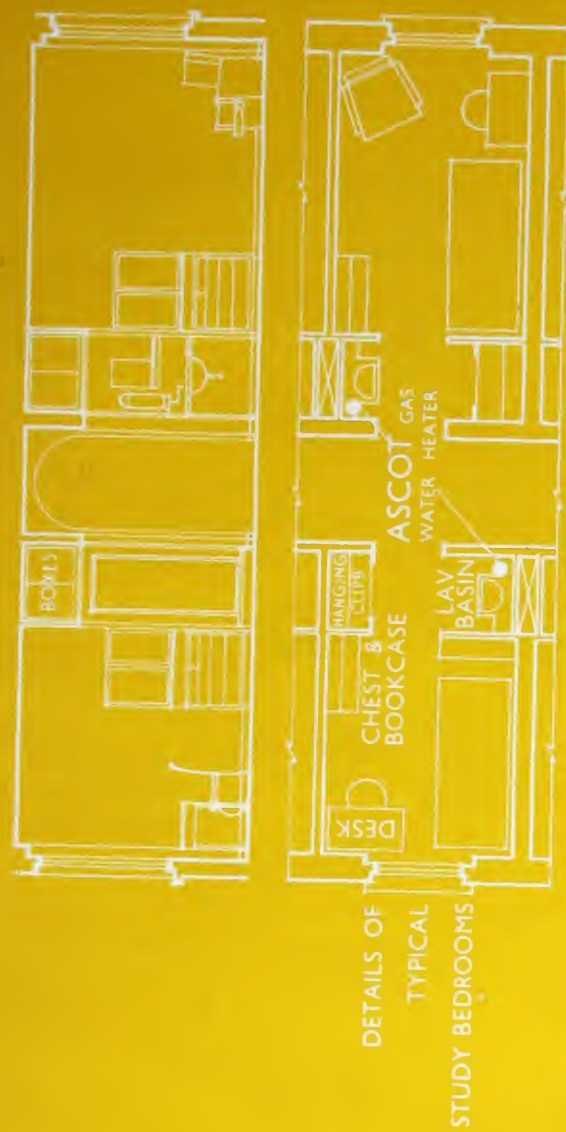




1st, 2nd & 3rd FLOORS

BEFORE CONVERSION

AFTER CONVERSION



1st, 2nd & 3rd FLOORS GENERALLY



# 19<sup>th</sup> CENTURY TENEMENTS AS 20<sup>th</sup> CENTURY FLATS AN INTERIM POLICY FOR SCOTLAND

R. MERVYN NOAD, A.R.I.B.A.

*"The extent and volume of house production in boom periods in the latter half of the nineteenth century in Scotland is not perhaps as widely appreciated as it might be. For example, in Glasgow alone in 1876 no fewer than 5,746 houses were built, of which nearly 70 per cent. were of two apartments or less. This total output of houses has only twice been exceeded since 1919, despite the large-scale operations of the local authority under the Housing Acts in the inter-war years. Similar large-scale building of houses of one and two apartments occurred during the latter half of the nineteenth century in Scotland as a whole, and this activity reached its peak in 1900 when over 22,000 new houses were built in Scotland in the space of a single year, the majority of which again were of one and two apartments. The percentage of houses of these sizes erected in Glasgow, for example, in that year was 55 per cent. It is the houses built in this period which give rise to the gross overcrowding, the elimination of which will be one of the primary objects of the housing programme. . . ."*

**" PLANNING OUR NEW HOMES "**

*A report by the Scottish Housing Advisory Committee*



It is not suggested that present-day town-planners should go to extreme lengths to incorporate everything that the past has left, but it is a somewhat feeble approach to the problem to rule out what was built before this century, other than historical monuments. Ultimately it should be possible to house Scotland under modern conditions, but until then it is considered that, by slight rearrangement, Victorian tenements could be converted into reasonable modern housing, as an interim policy.

As they stand, the worst of these consist of single and two-roomed dwellings ; and in Glasgow, to take but one case, there are still 35,673 of the single, and 110,863 of the two-roomed type. These are contained in large areas of solidly-built structures with monotonous, smoke-blackened street frontages, often backing on ample, though derelict, courtyards. The dwellings are approached by passages or "closes" that connect with communal staircases, each with its one W.C. to a landing, serving as many as five dwellings with an average population of thirty.

The external walls and mutual gables are usually of stone at least 2 ft. thick. The street-frontages are dressed ashlar, with moulded string-courses, architraves and cornices, random rubble being used for the courtyard elevations without any embellishments to doors or windows. Stone staircases are enclosed by 9 in. walls, with a similar wall parallel to the frontages halving the typical 40 ft. broad span. Other than these, the internal divisions are of 4½ in. brick, or lath and standard, and it is these that give the "rabbit-warren" effect to the interior of the plans. Each room in every dwelling is provided with a built-in box bed (no doubt delightfully warm in winter), and the plumbing per family is limited to one iron sink.

Obviously, for any suggested interim reconstruction, it would be uneconomical to make radical changes in either the external walling or the internal 9 in. load-bearing walls. The problem therefore becomes one of eradicating the 4½ in. partitions—which, incidentally, would eliminate the major sources of bug-infestation—and of replanning on modern lines. The greatest handicap to this is the 40 ft. breadth, front to back, when compared with the 25 ft. to 30 ft. of present-day flats because, as in the existing arrangement, this tends to give a dark spot within the body of the plan, and other than by borrowed lights or glass door-panels, it is virtually impossible to overcome this objection under any rearrangement.

\* The part typical plan before conversion shows four dwellings on the left side of the central mutual gable, with five on the right ; and at present these accommodate, on an average, 8 adults and 15 children and 10 adults and 21 children respectively on each floor. Compared with known examples of 19 persons to two rooms, this is extremely moderate. In the part typical plan after conversion, the left side is shown with one two-roomed and one three-roomed flat ; with, on the right, two three-roomed flats, each with its own bathroom, and in one case a kitchen, as an alternative to a living-room kitchen. (Although it is common practice on the Continent, it is regarded as retrogressive in Scotland to plan an internal bathroom, even where ventilation is possible. Most Local Authorities would disapprove of this suggestion, but it utilises a dark internal section, and its inclusion might be considered as a merely temporary expedient.)

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\*As necessitating the most urgent attention, the subject chosen was taken from slum property, of which it is typical.

The orientation of the example shown is east to the street and west to the courtyard, and this dictated the arrangement of the rooms because, in the future, we must overcome the Victorian adage, often resulting in a sunless living-room, that it is only "respectable" to face the street. The bow-windows shown on the revised plan, though desirable, are not strictly practical politics, but if the two plans are compared it will be seen that, even with their elimination, each living-room would have two windows to the west, making the eight bathroom-windows the only necessary change in the existing elevation.

The kitchen and bathroom fittings have been shown back-to-back for simplicity in plumbing; and when mass-produced units become general, there is no reason why standard fittings could not be fitted throughout, as recognised family-necessities. The larger flats are equipped with Ascot Instantaneous Multi-point Gas Water-Heaters; and the smaller two-roomed flat, where the sink-unit is separated from the bathroom, has an Ascot Instantaneous Bath Water-Heater in the bathroom and an Ascot Boiling Water Appliance in the living-room kitchen.

Other than planning and elevational treatment, the main difference between pre-war Continental flats and nineteenth century tenements is the latter's total lack of colour. Stonework, down-pipes, gutters, doors and windows are now all of varying shades of black, unrelieved by vegetation unless it be a few struggling weeds in the courtyards. In the glory of their new light-yellow sandstone, the cities and towns must, at their time of building, have presented a very different picture, which could be recaptured at a price (though due to the lack of smoke-abatement, the amelioration would only be temporary) by stone-painting or other treatment.

Admitting that this would probably be killed by recurring expenditure, there is no such reason why back courtyards could not be opened up and improved. At present, in the poorer districts they are a picture of complete desolation; ruinous wash-houses, ashpits and dividing walls mingle with flooded undulations, spiked railings, washing-lines and every type of garbage. All of these may be necessary, but not in their present chaotic state of unplanned disrepair, and it would be an interesting experiment to watch the reaction of the present inhabitants to a Continental courtyard. Would they stone the sculpture, cut down the plane-trees and generally wreck the kindergartens, laundries, children's sand-pits, flower-beds, paving and steps? Possibly there would be a few cases at first, but not when the benefits were appreciated, as undoubtedly they soon would be.

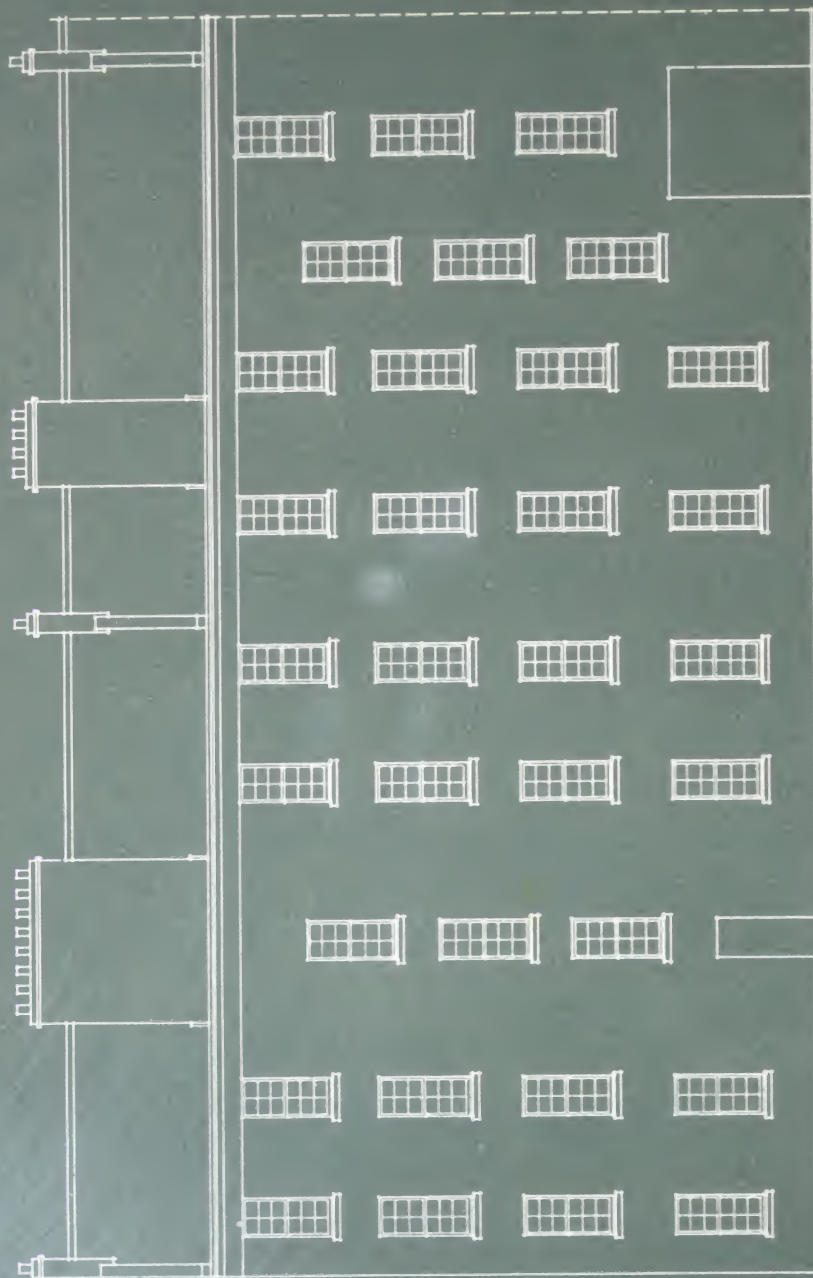
Ultimately all these Victorian tenements will be demolished and cleared away, along with their depressing accompaniments. Breathing-space will be increased, and although evidence shows that the majority prefer cottage or flatted houses with individual gardens, there will always remain a minority who hate gardening and who would infinitely prefer to live in city flats, more readily accessible to their work. To some, the communal spirit of a block of flats is one of their greatest pleasures, and it is an accepted fact that their ground floors are admirable for old people.

From the foregoing it should not be assumed that tenement or flat development in Scotland has remained static during the period 1900-1946, because it is with the conversion possibilities of nineteenth-century tenements that this essay is primarily concerned. With the years came change of style, increased amenities and improved sanitation, but

always it was our old friend in Edwardian or Georgian dress. The basic prototype remained the backbone of the plan, although the "closes" of the west-end might acquire tiled walls and terrazzo-finished staircases.

Since 1919 certain enlightened Local Authorities have built many deservedly commendable schemes, which admirably fulfil their purpose. Others have undoubtedly provided additional accommodation, but in so doing have in no way beautified Scotland. (A block of flats does not automatically become "modern" by the addition of balconies to an elevational treatment to which they are foreign, and British and Continental architects have shown that there are other lay-out possibilities than the customary alignment of buildings along main roads.)

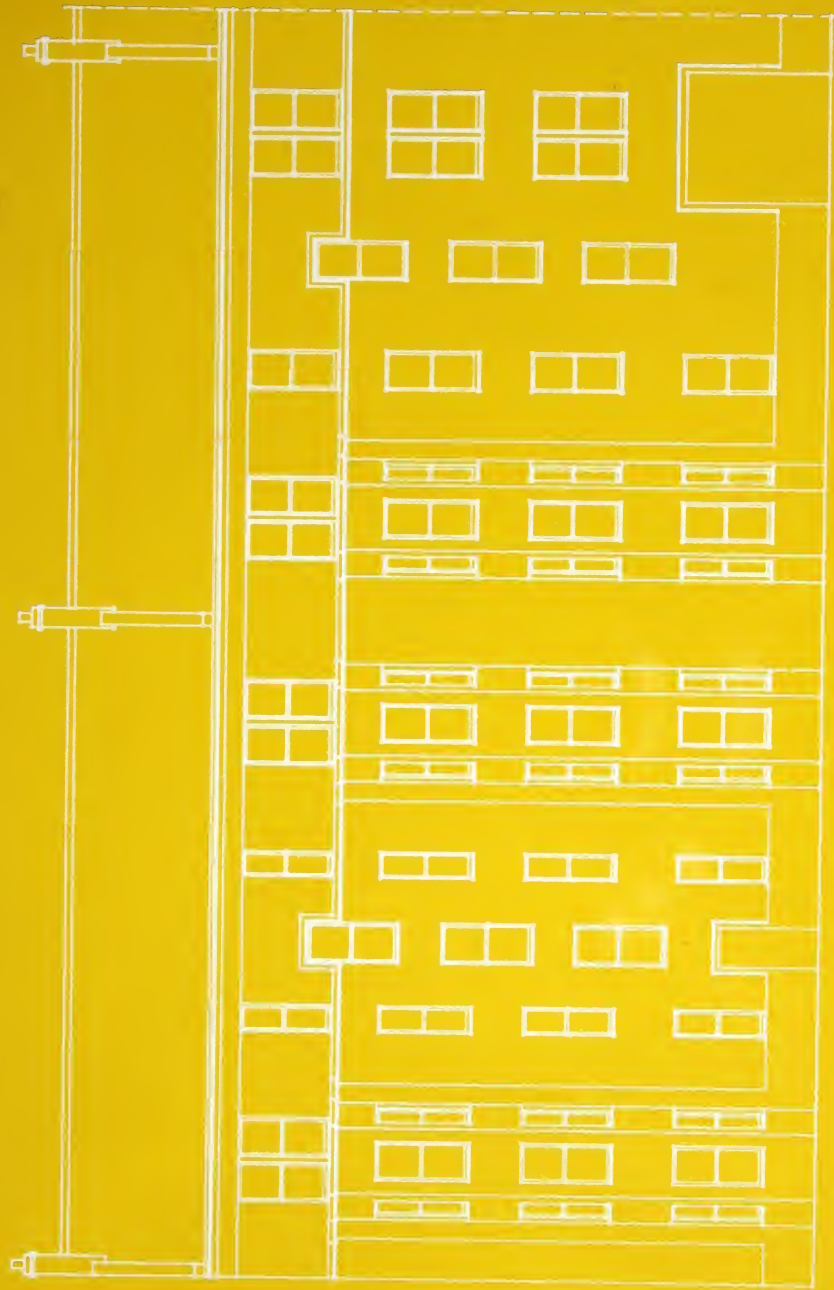
The bright to-morrow must therefore see extensive development and improvement in all types of flats. For those who have advanced during the inter-war years this further progress should not be difficult. But it must be fully appreciated that the tenement prototype is not the correct idiom for the future, however it may be adorned by new and wondrous materials. Far rather let us build on the imaginative lay-outs, plans and elevations of the best twentieth-century types, irrespective of their country of origin. That this has been done for higher grade flats is readily apparent in most large cities, and it is surely only the next stage in our development that these acknowledged benefits should be made available to everyone.



PART ELEVATION TO COURTYARD

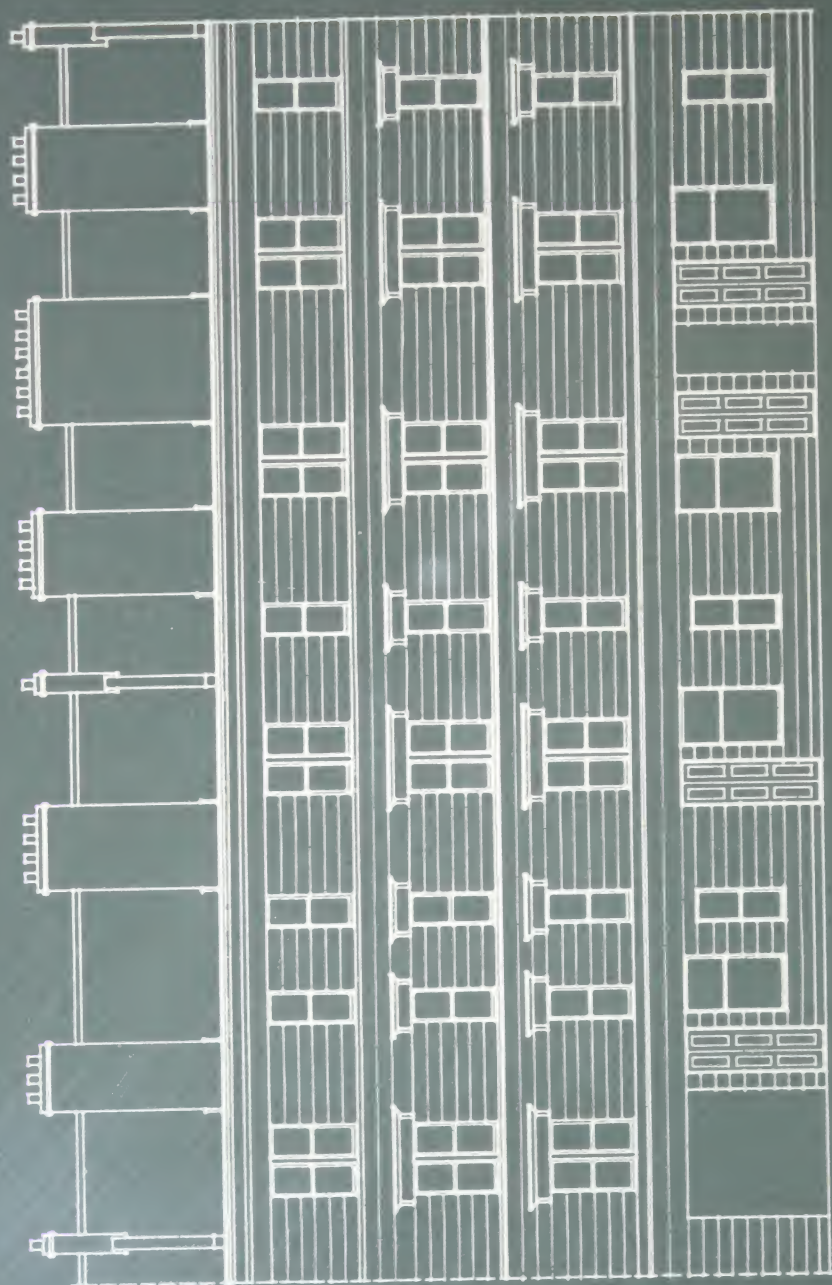
BEFORE CONVERSION

AFTER CONVERSION



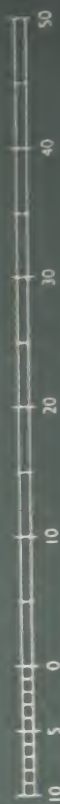
PART ELEVATION TO COURTYARD



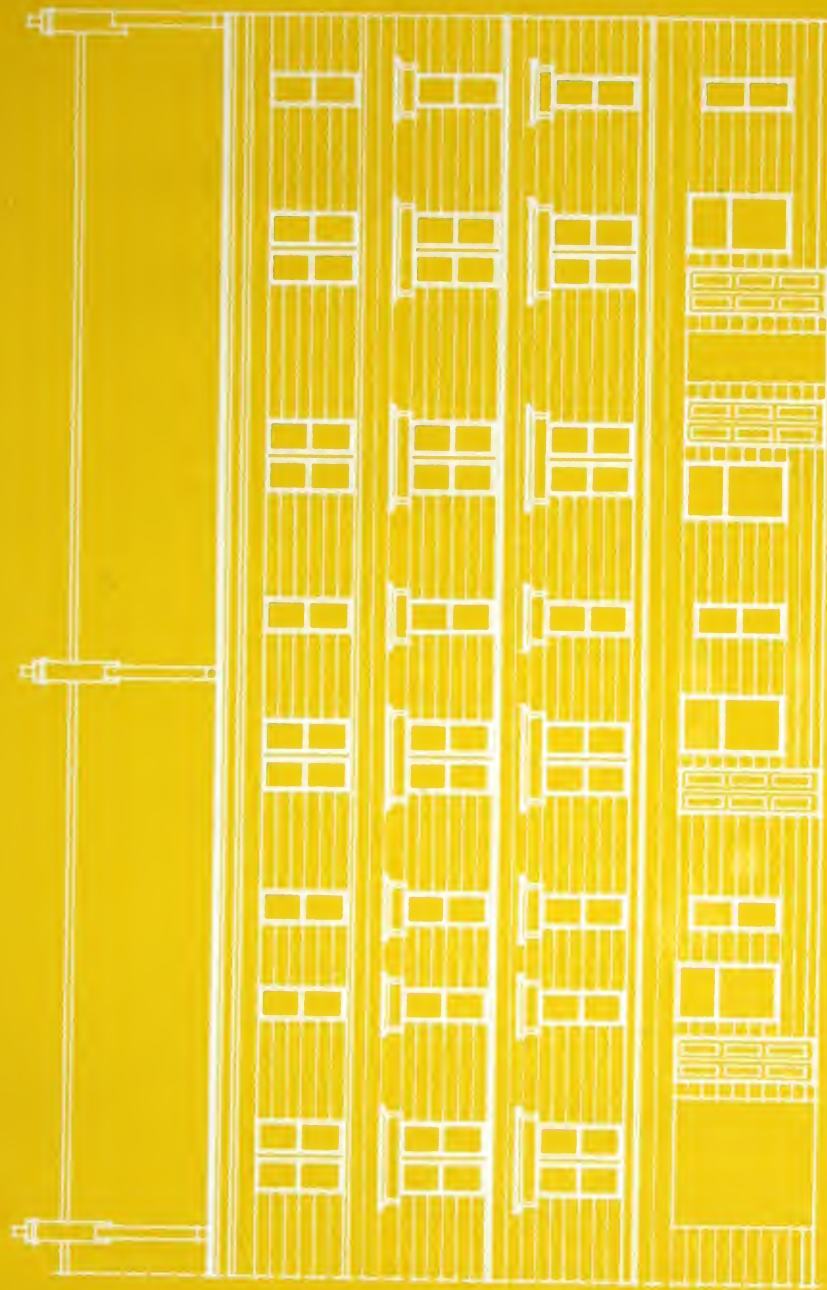


PART ELEVATION TO STREET

BEFORE CONVERSION

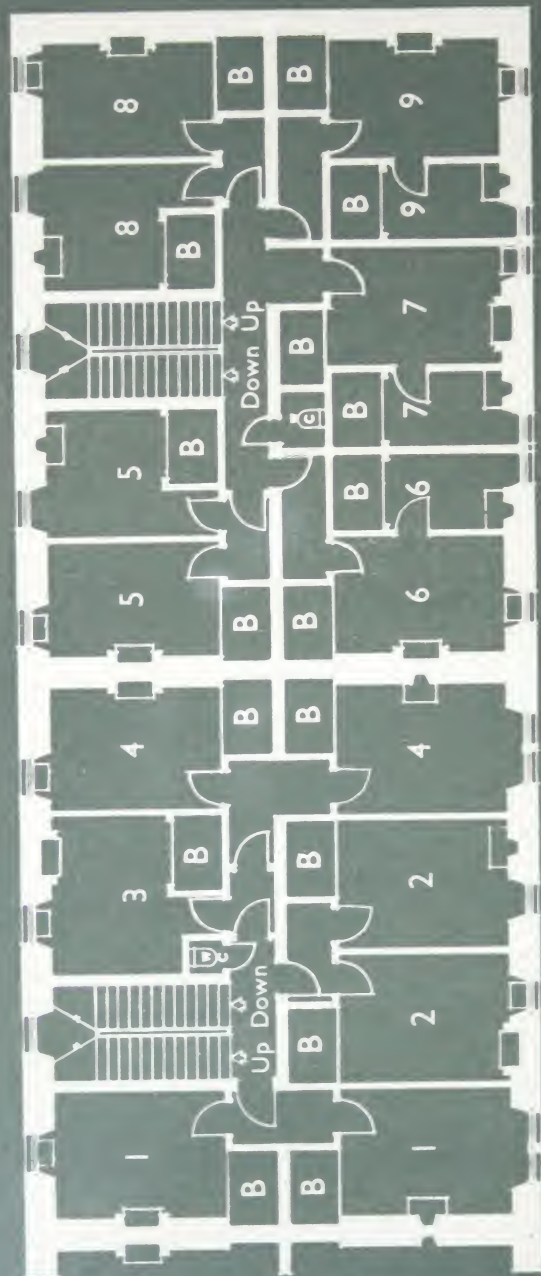


AFTER CONVERSION



PART ELEVATION TO STREET





PART TYPICAL PLAN

BEFORE CONVERSION



AFTER CONVERSION



PART TYPICAL PLAN





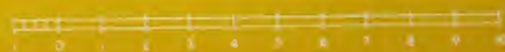
SECTION A-A



SECTION B-B



TYPICAL PLAN



# TWO ADJOINING 18<sup>TH</sup> CENTURY HOUSES IN ONE OF THE CRESCENTS AT BATH

H. AUSTEN HALL, F.R.I.B.A.



THESE houses were altered from the original state when they both came under the same ownership. The staircase at the trade entrance was blocked and new bathrooms added. It is now proposed to open up the staircase again.

The two houses are treated separately, apart from the basement which is left untouched.

## ACCOMMODATION PROVIDED

### LARGER HOUSE

- |              |   |
|--------------|---|
| GROUND FLOOR | Flat comprising hall and cloakroom, sitting room, three bedrooms, bathroom and kitchen. The hall in this case will probably be used as a dining room. |
| FIRST FLOOR  | Flat consisting of four bedrooms, two bathrooms, sitting room, kitchen and hall, which could also be used as a dining room.                           |
| SECOND FLOOR | Similar flat to the one available on first floor.   |
| THIRD FLOOR  | Flat consisting of sitting room, dining room, kitchen, four bedrooms and two bathrooms.   |

### SMALLER HOUSE

- |              |   |
|--------------|---|
| GROUND FLOOR | Flat comprising large sitting room, kitchen, one bedroom and bathroom.  |
| FIRST FLOOR  | Flat similar to the one on the ground floor.  |
| SECOND FLOOR | These two floors have been converted into a maisonette with hall, sitting room, dining room and kitchen on one floor, and three bedrooms and bathroom on the floor above. |
| THIRD FLOOR  |   |

Each flat is provided with its own coal store and dustbin.

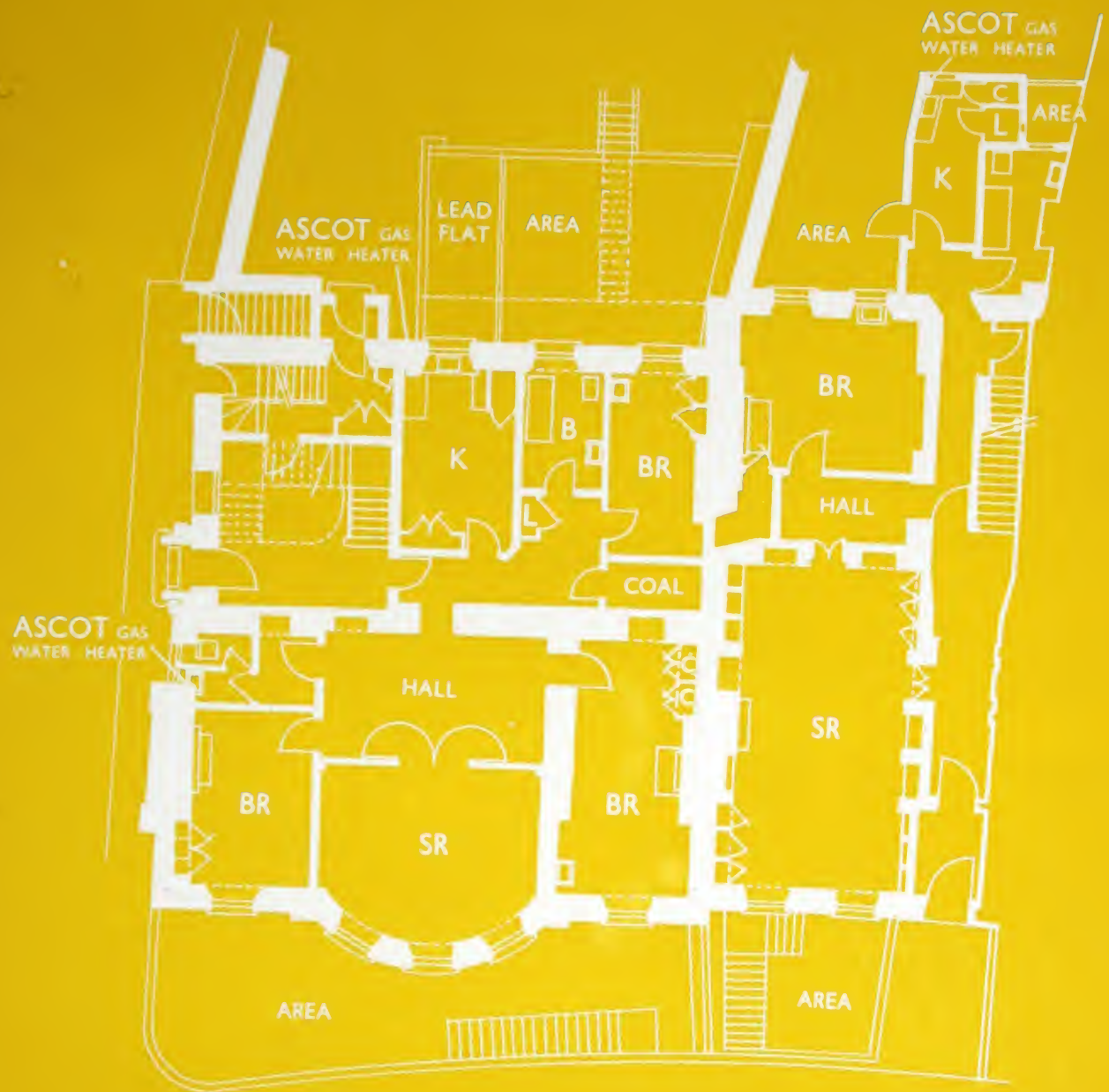


GROUND FLOOR



BEFORE CONVERSION

TWO ADJOINING 18TH CENTURY HOUSES AT BATH

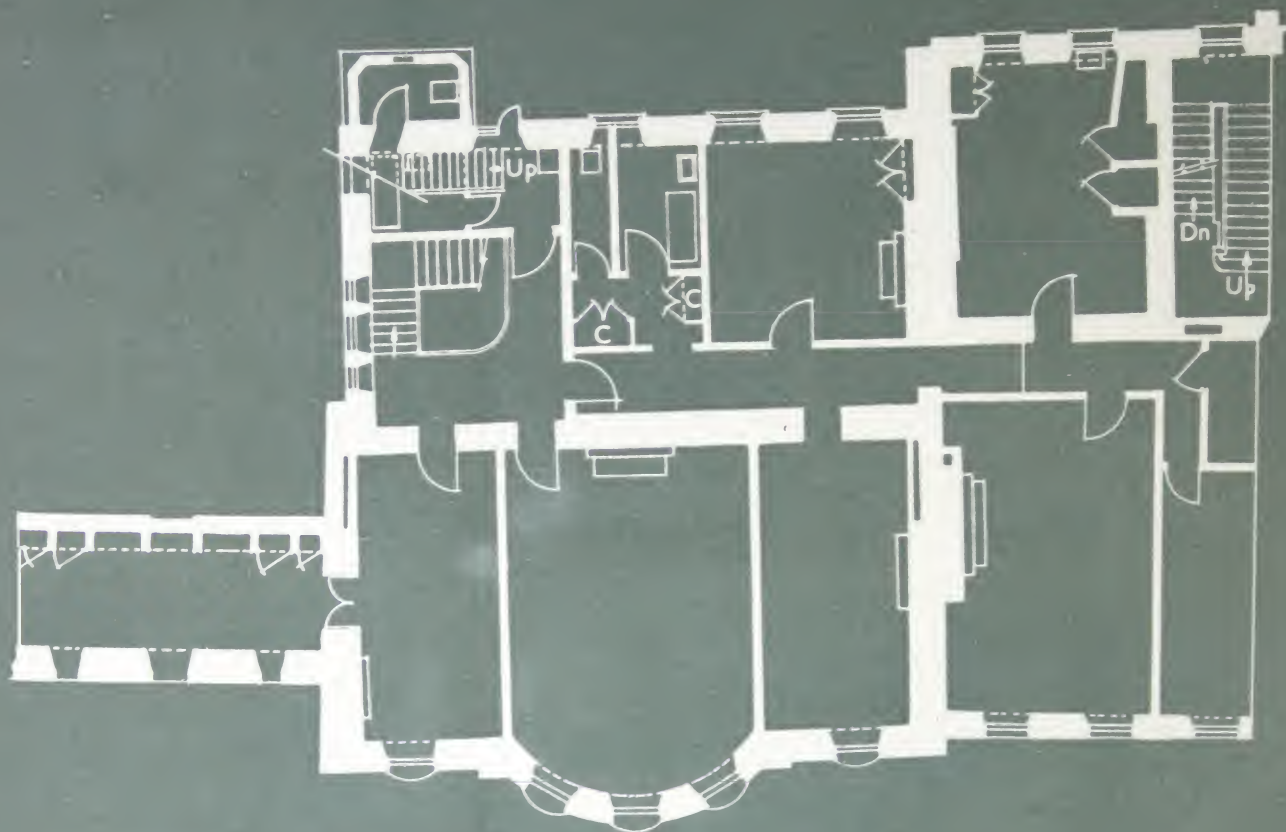


GROUND FLOOR

AFTER CONVERSION



TWO ADJOINING 18TH CENTURY HOUSES AT BATH

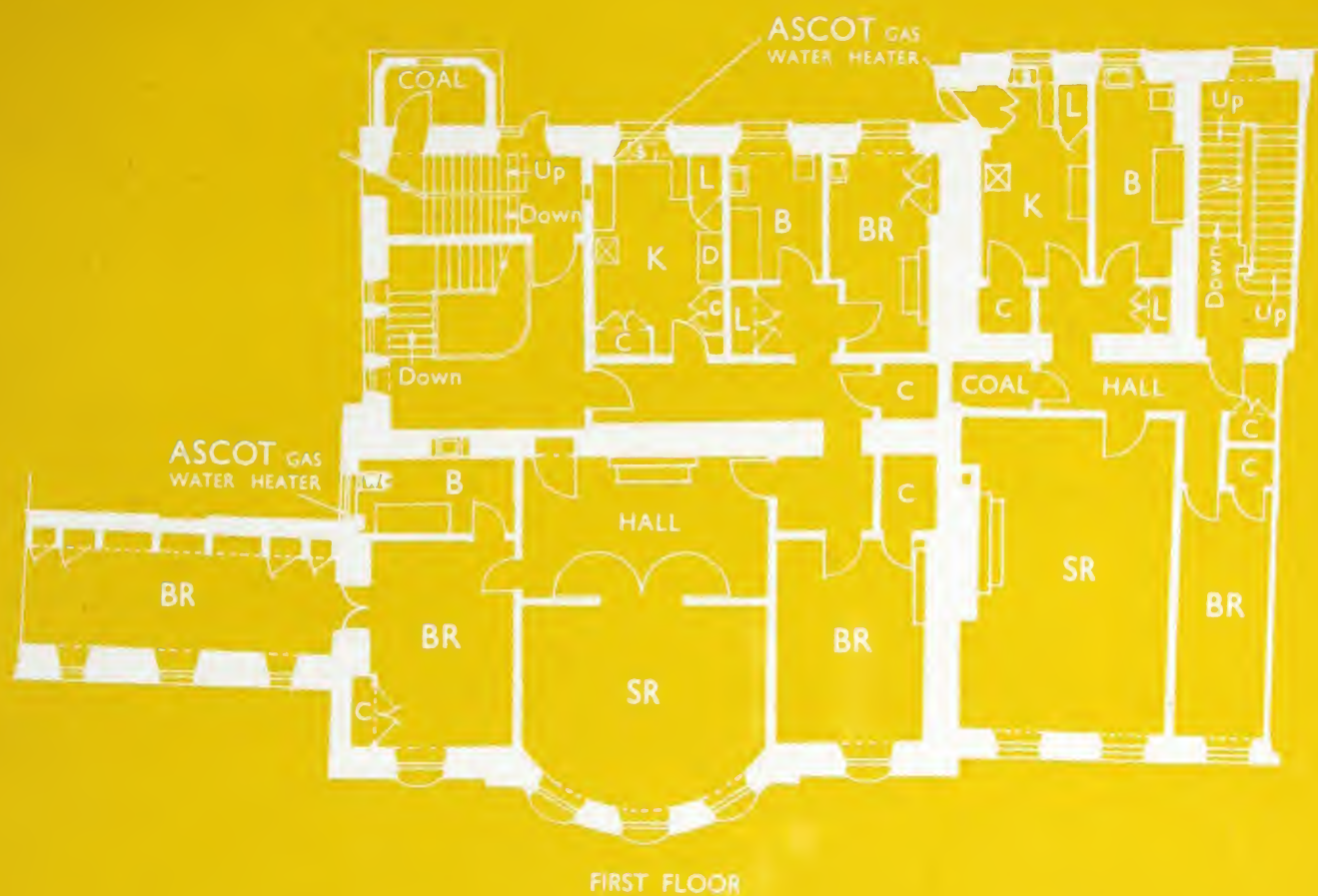


FIRST FLOOR



BEFORE CONVERSION

TWO ADJOINING 18TH CENTURY HOUSES AT BATH



AFTER CONVERSION





SECOND FLOOR



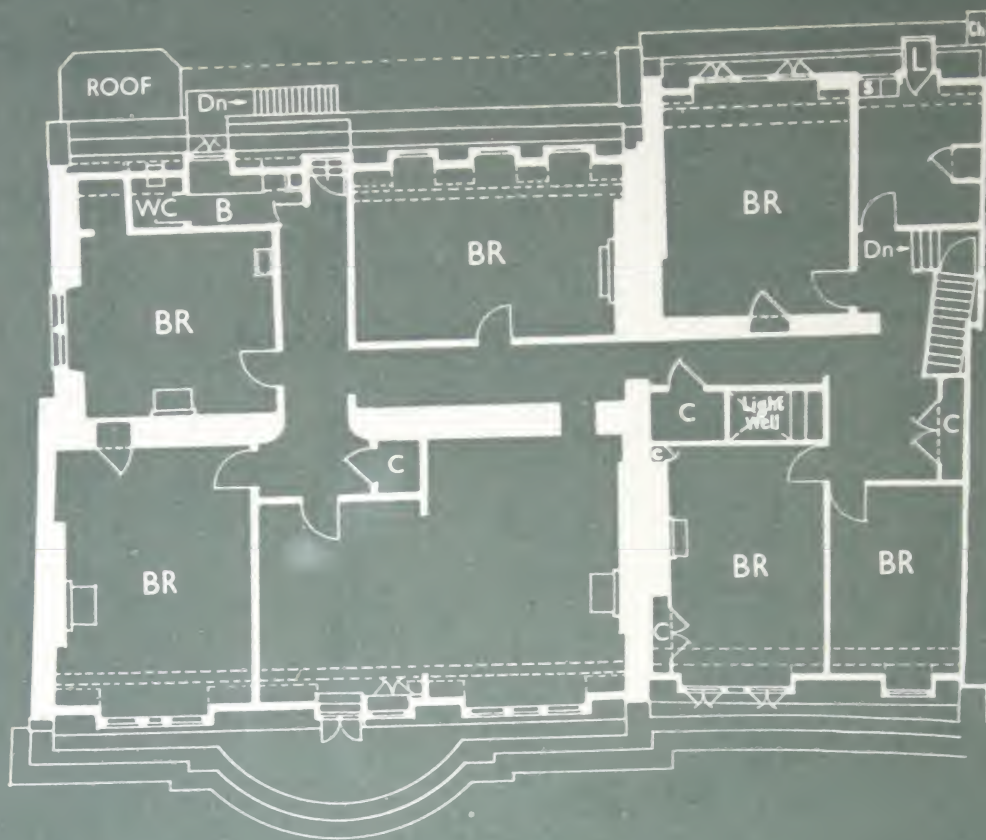
BEFORE CONVERSION



AFTER CONVERSION



TWO ADJOINING 18TH CENTURY HOUSES AT BATH



THIRD FLOOR



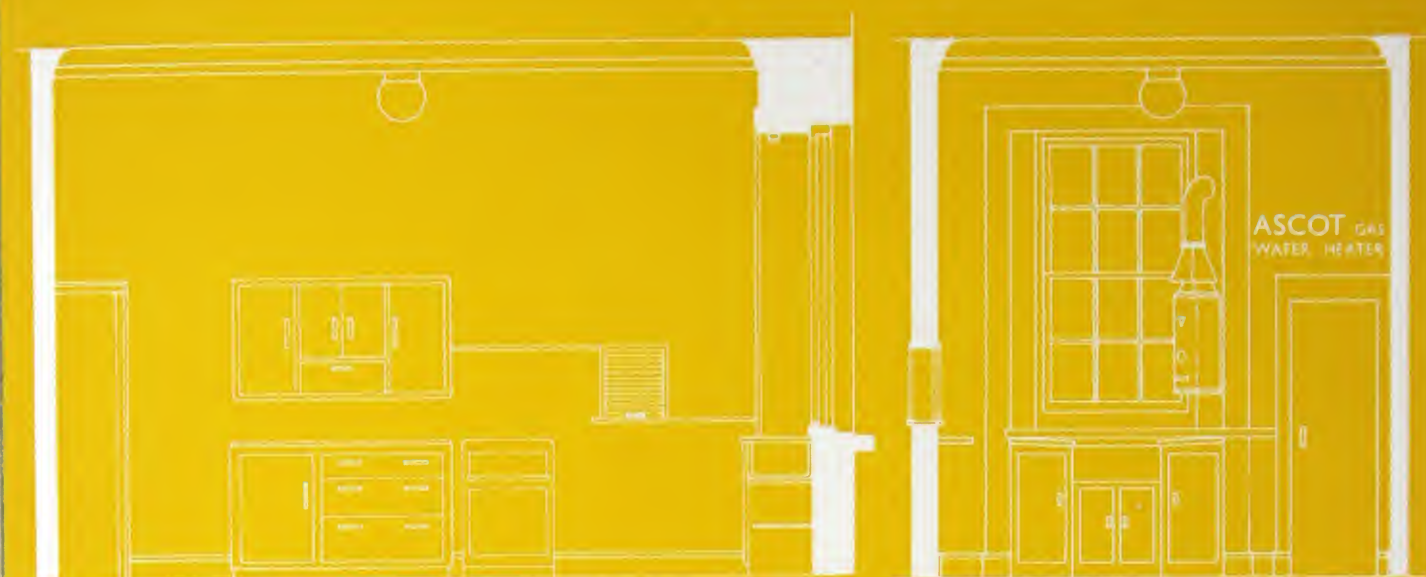
BEFORE CONVERSION



AFTER CONVERSION

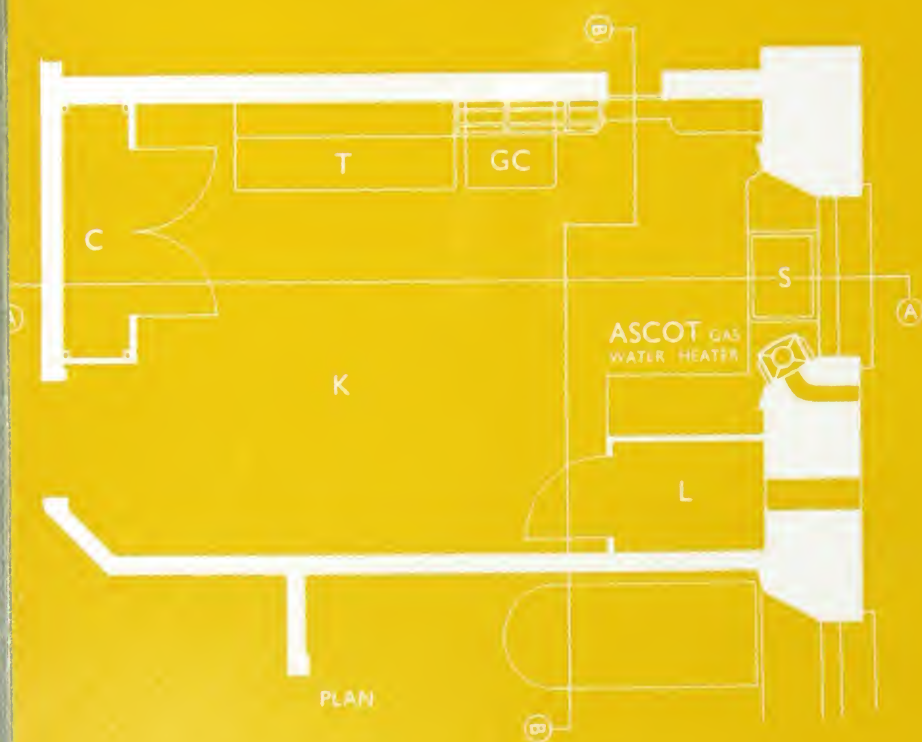


TWO ADJOINING 18TH CENTURY HOUSES AT BATH



SECTION A-A

SECTION B-B



TWO ADJOINING 18TH CENTURY HOUSES AT BATH

# HOUSE ON CHELSEA EMBANKMENT

MESSRS. GEORGE FAIRWEATHER & R. FURNEAUX JORDAN,  
F.F.R.I.B.A.



**T**HIS house is a particularly fine one, and is indeed something of a landmark for those familiar with Chelsea Reach. It is one of that range of mansions, including the famous Swan House, which were either built or remodelled by the more famous architects of a generation ago. This particular example looks south across the river to Battersea Park and east over the Physics Gardens—one of the most beautifully laid out of London's garden spaces. In outlook, therefore, the house is unrivalled. It was extensively altered and replanned some forty years ago for a great patron of the arts. The architect for this rebuilding was the late C. F. A. Voysey, F.R.I.B.A. The house may, therefore, be considered as a typical fine town mansion of an unusual kind and of an interesting period, with much interior work, panelling, fireplaces, tiling, etc., all in the best tradition of the Arts and Crafts Movement.

The excellent equipment and craftsmanship—more particularly the excellent automatic passenger lift and the modernised plumbing and heating arrangements—all facilitated the proposals for conversion. On the other hand the decorative treatment of the interiors—originally carried out on oak, plasterwork, slate and the kind of lustre ware that one associates with De Morgan—created for the architects a particularly delicate problem. In these days of rigid restriction there could be no question of reproducing the lovely craftsmanship for which Mr. Voysey was responsible. To insert bathrooms and kitchenettes into these magnificent rooms, with their tall windows looking across the tideway, seemed at first little less than vandalism. The problem was to put new partitions into rooms which were panelled out by Mr. Voysey in the finest oak work which the craftsman of his time could produce. By careful planning of the subdivided rooms it was possible to preserve fairly good proportions, but the treatment of the partitions themselves remained a difficulty. The architects eventually decided that these partitions—separating the bathrooms, etc., from the main bed-sitting rooms—must be regarded less as walls than as a sort of rigid curtain. Regarded in this light the new partitions lent themselves to an all-over decorative treatment in colour and pattern. By searching for fabrics or papers, Morris papers for example, and using these for covering the partitions, an effect was arrived at which Voysey himself might have approved. The fabric or paper-covered partitions remain a contrast with the walls, but their period flavour is such as to prevent them being a discord.

The First Floor flat—the most magnificent of all—presented the fewest problems. The great Edwardian entertaining rooms remain almost untouched, and the fine reception

landing at the head of the oak staircase forms a worthy private entrance hall for the whole flat. Bathroom and kitchen have had to be tucked in as on the floor below, but the finest room of all needed no treatment—not even decoration—the library with its lovely glass-fronted shelves and its large mullion window looking on to the Physics Garden.

On the upper floors, of course, bathrooms existed but space had to be found for kitchens. In some ways, these upper floors—regarded as modest-sized family flats—are more suitable for modern ideas of living than are the more grandiose rooms on the lower floors. The Second Floor, especially, makes a charming flat, with simple tiled fireplaces and with a French window opening on to a roof garden at the back. Among the specially built mansion block flats of the West End there is hardly a flat which in convenience and charm can rival this adapted floor of what was once servants' bedrooms.

The flats are, of course, all self-contained and are all served by the automatic passenger lift. This lift is also fitted with tray shelves, etc., and can be sent up and down unattended ; it therefore makes an admirable service lift when required. All the flats are exceptionally well equipped. So fully cupboarded was the original house that very little had to be done to make these flats suitable in this respect for modern needs. The modern gas boiler in the basement has been reserved for central heating purposes, the hot water for kitchens and bathrooms in each flat being provided by an Ascot multi-point gas water heater.

THE ILLUSTRATIONS ON THE FOLLOWING PAGES ARE  
OF THE INTERIOR OF THE HOUSE ON CHELSEA EMBANK-  
MENT DESIGNED BY THE LATE C. F. A. VOYSEY

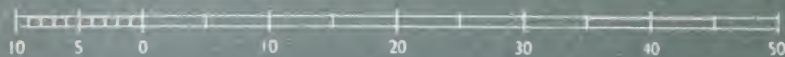








BASEMENT



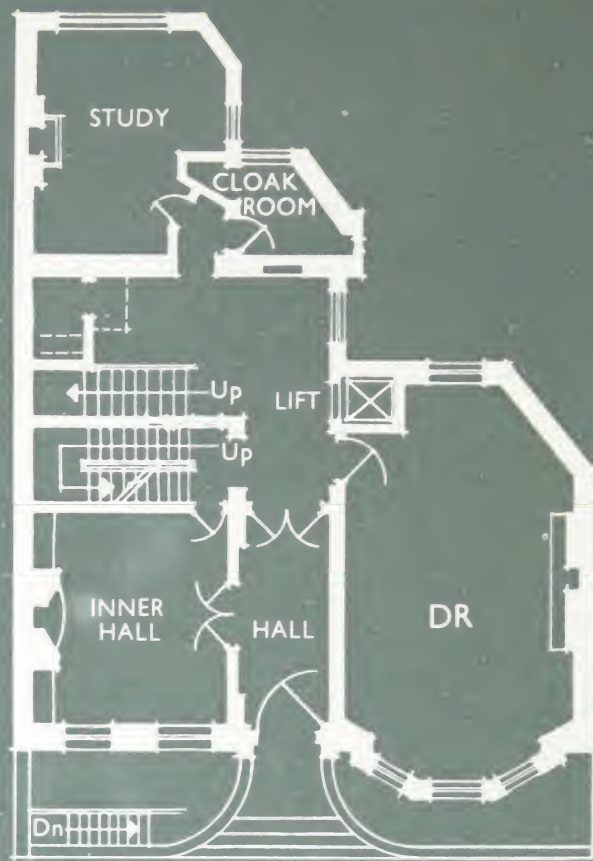
BEFORE CONVERSION



BASEMENT  
CARPETAKER'S FLAT

AFTER CONVERSION





GROUND FLOOR

CHELSEA EMBANKMENT



BEFORE CONVERSION



GROUND FLOOR

CHELSEA EMBANKMENT

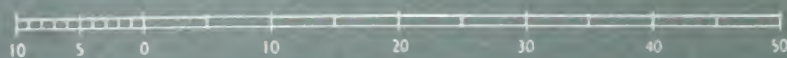
AFTER CONVERSION



HOUSE ON CHELSEA EMBANKMENT



FIRST FLOOR



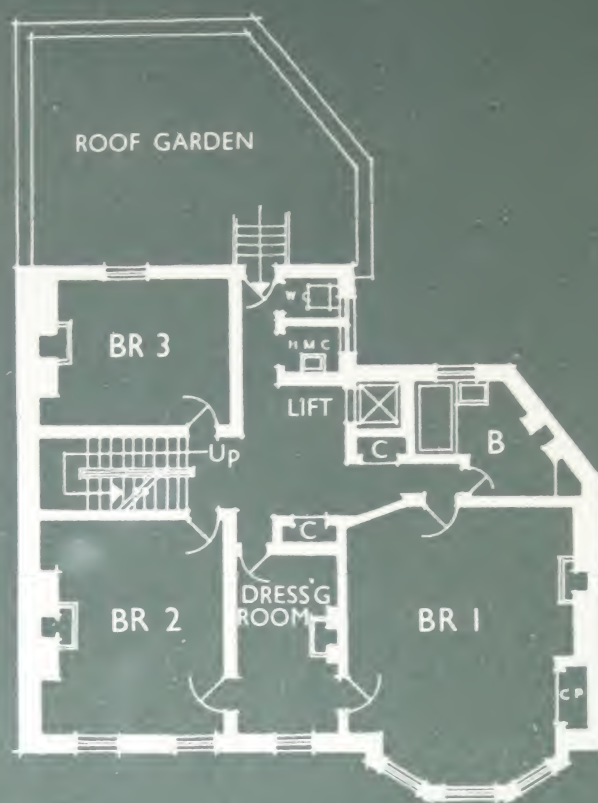
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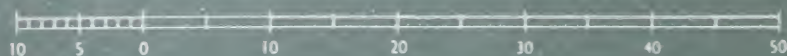
AFTER CONVERSION



HOUSE ON CHELSEA EMBANKMENT



SECOND FLOOR



BEFORE CONVERSION



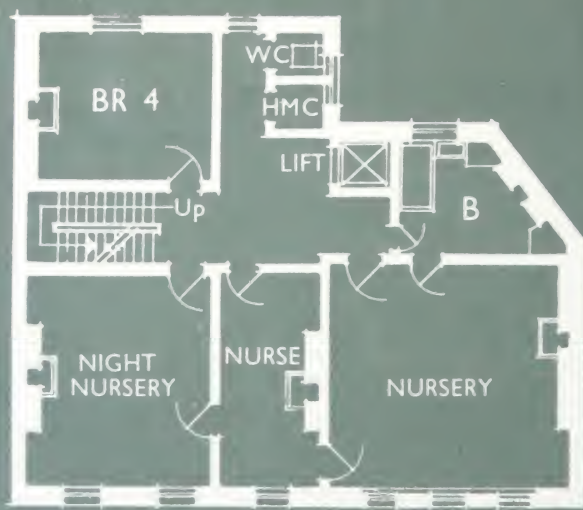
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HOUSE ON CHELSEA EMBANKMENT



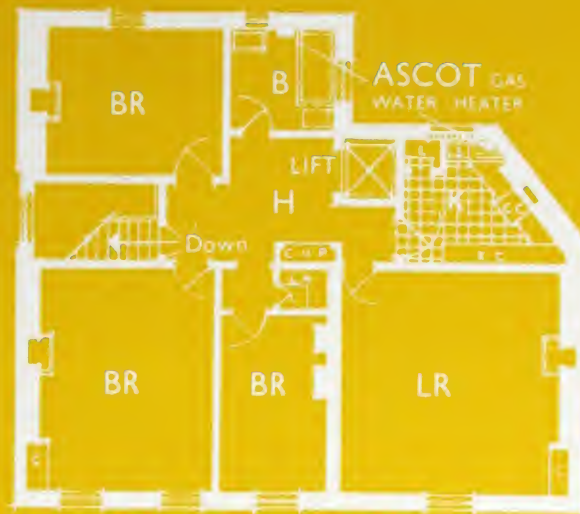
FOURTH FLOOR



THIRD FLOOR



BEFORE CONVERSION



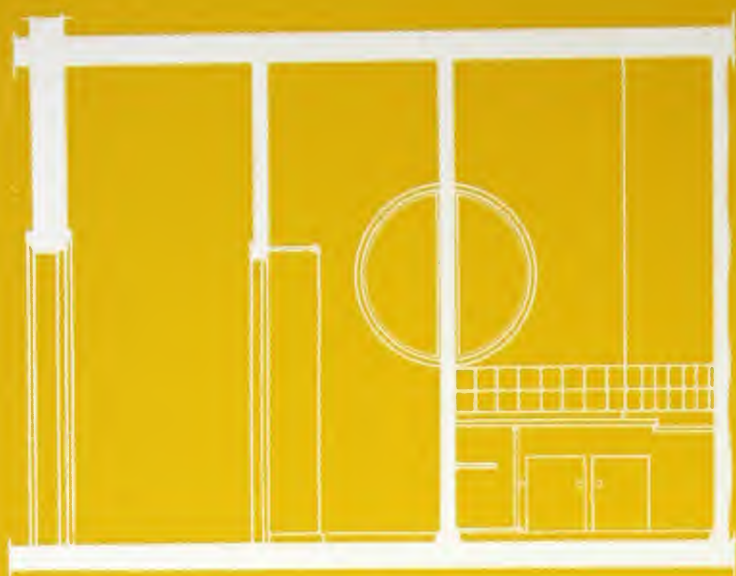
FOURTH FLOOR



THIRD FLOOR

AFTER CONVERSION

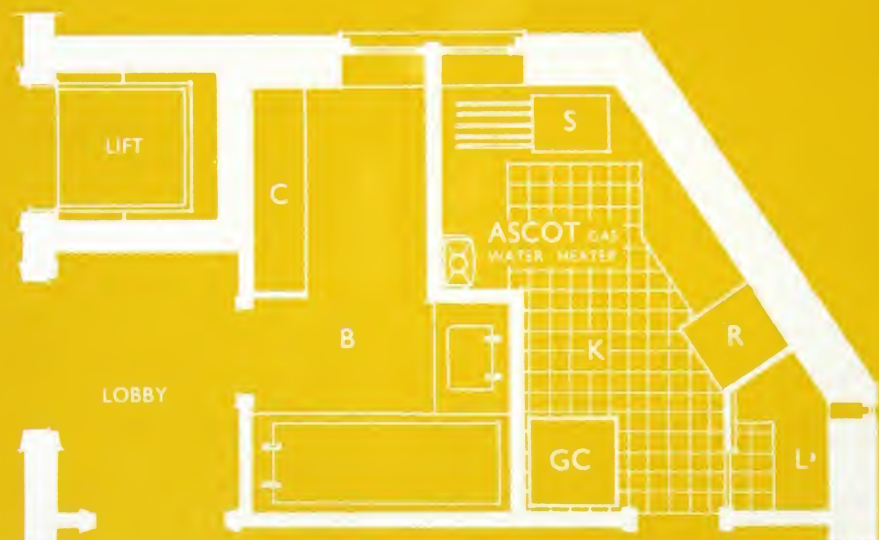




SECTION



SECTION



BSR

PLAN





SECTION



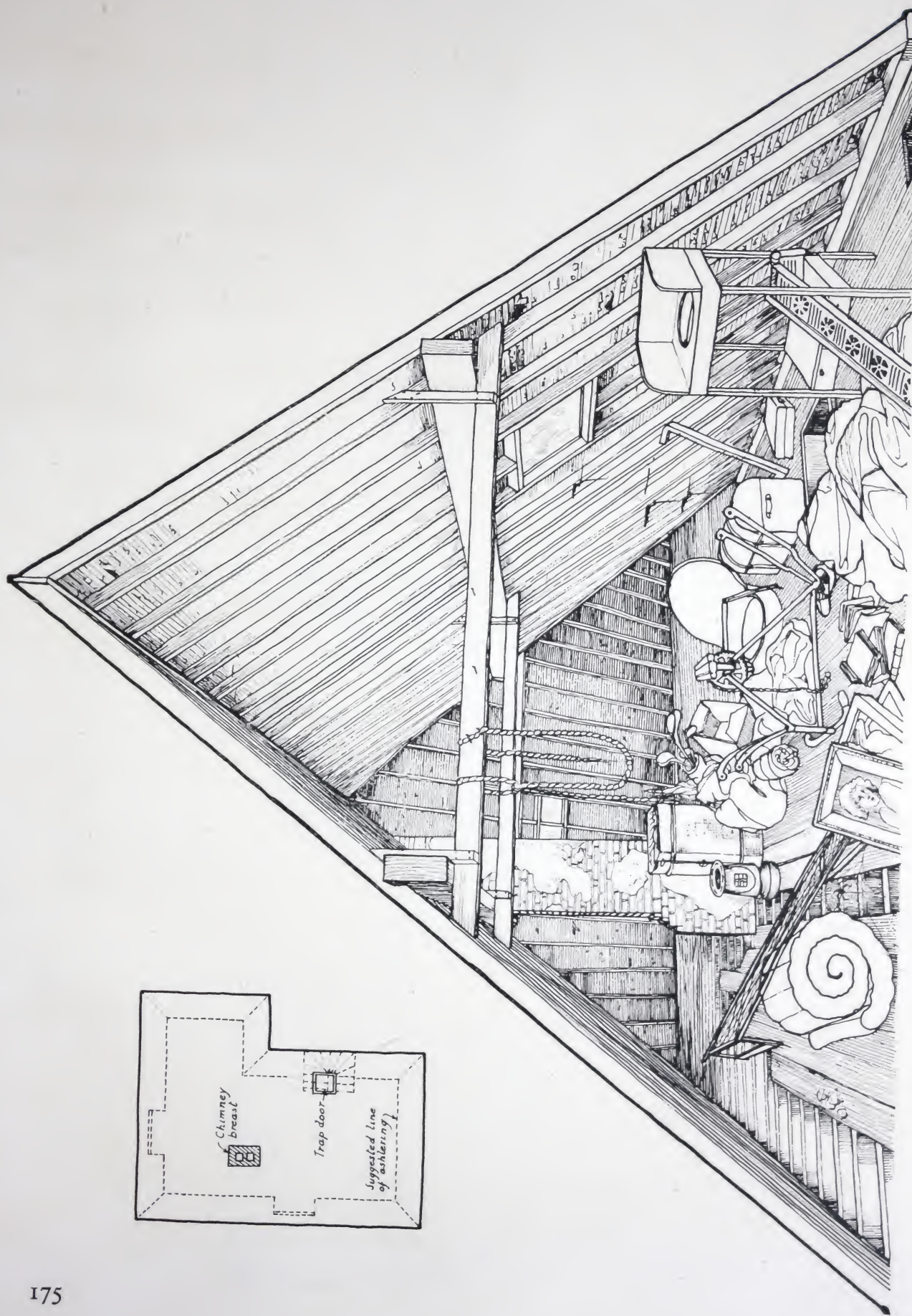
HOUSE ON CHELSEA EMBANKMENT

# THE ATTIC

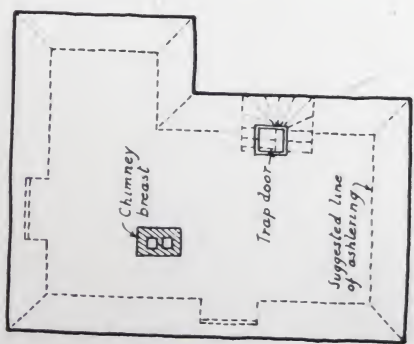
NANCY GREY

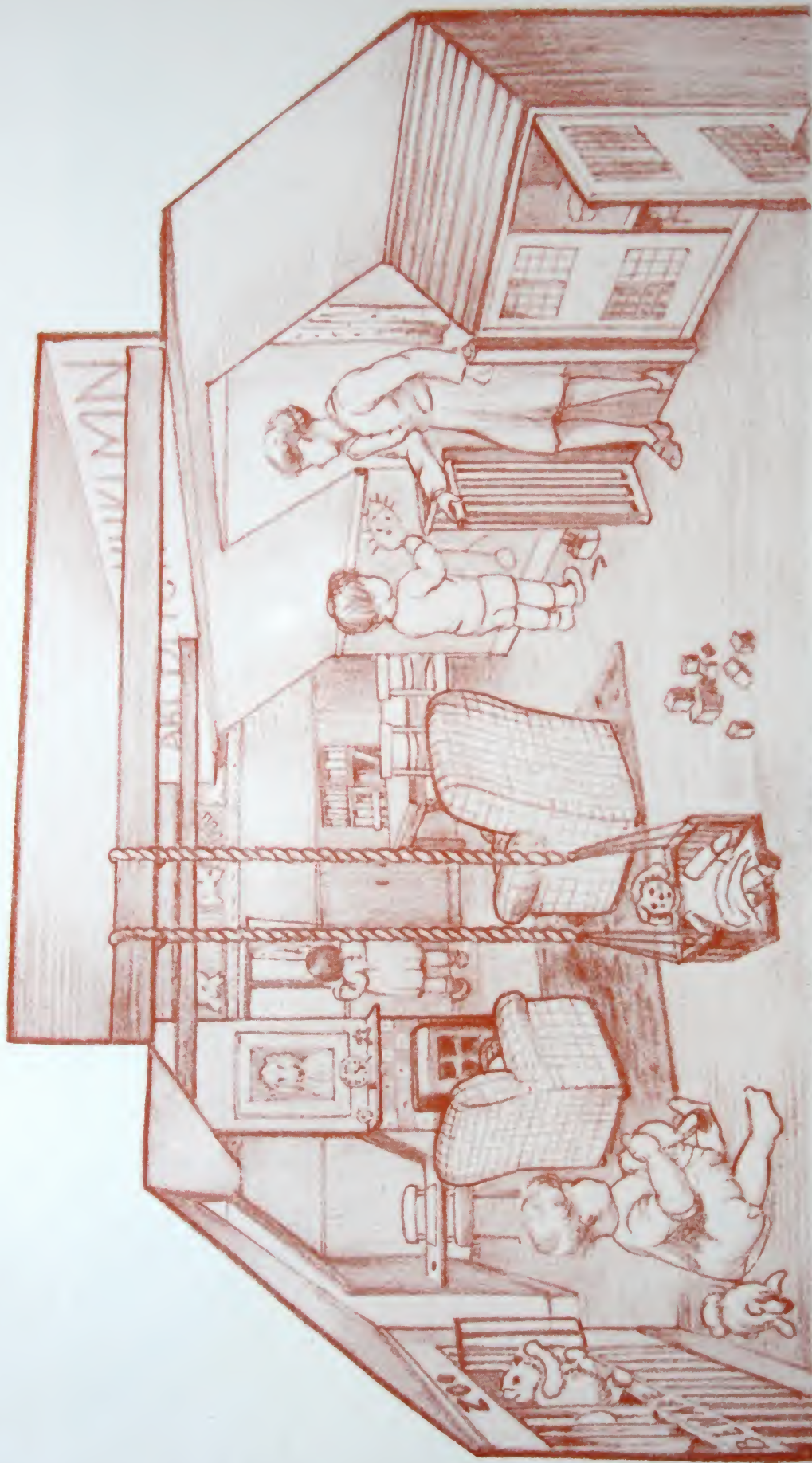


THE attic conjures up in our mind a picture of a murky, cobwebbed triangle, under the roof, the storehouse of unwanted and usually bulky relics, reached with difficulty by a rickety ladder through a rather too small trap door. Now that space has become valuable, however, the attic, by the installation of a loft ladder or staircase and the introduction of dormer windows can be converted at low cost into a large room which lends itself to various imaginative treatments. Being aloof from the rest of the house if its occupants are noisy they will not disturb the household or, contrariwise, it can be used by the studious to protect them from the noise below. Therefore it can make an excellent nursery for the young, a playroom for the not so young, a studio for the artist or study for the author. It should, where possible, be kept as one room as space is limited and the roof low and tends to make small rooms oppressive. In the following sketches I have suggested how it could be put to different uses whilst still retaining the character and structure of an attic.



A TYPICAL ATTIC

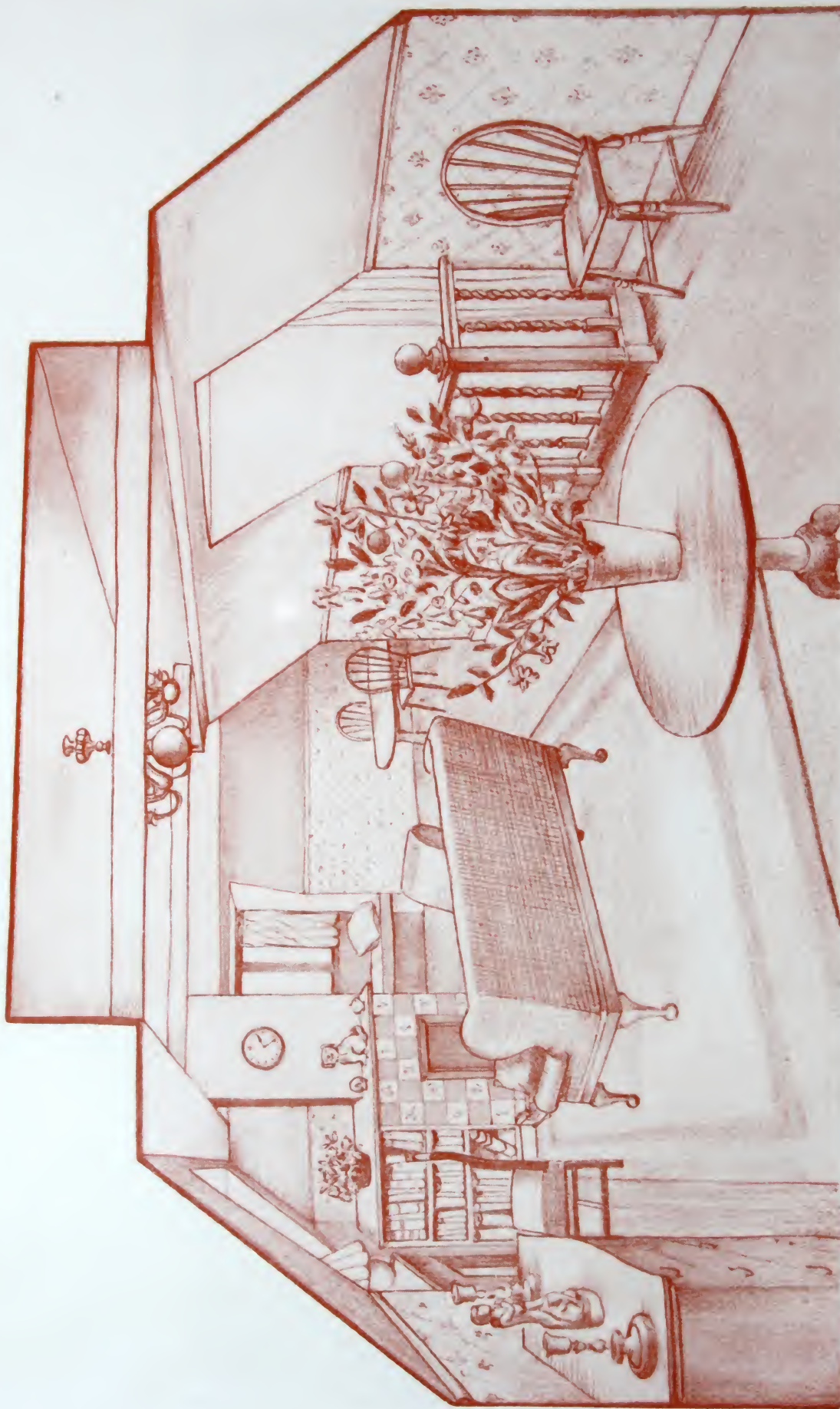




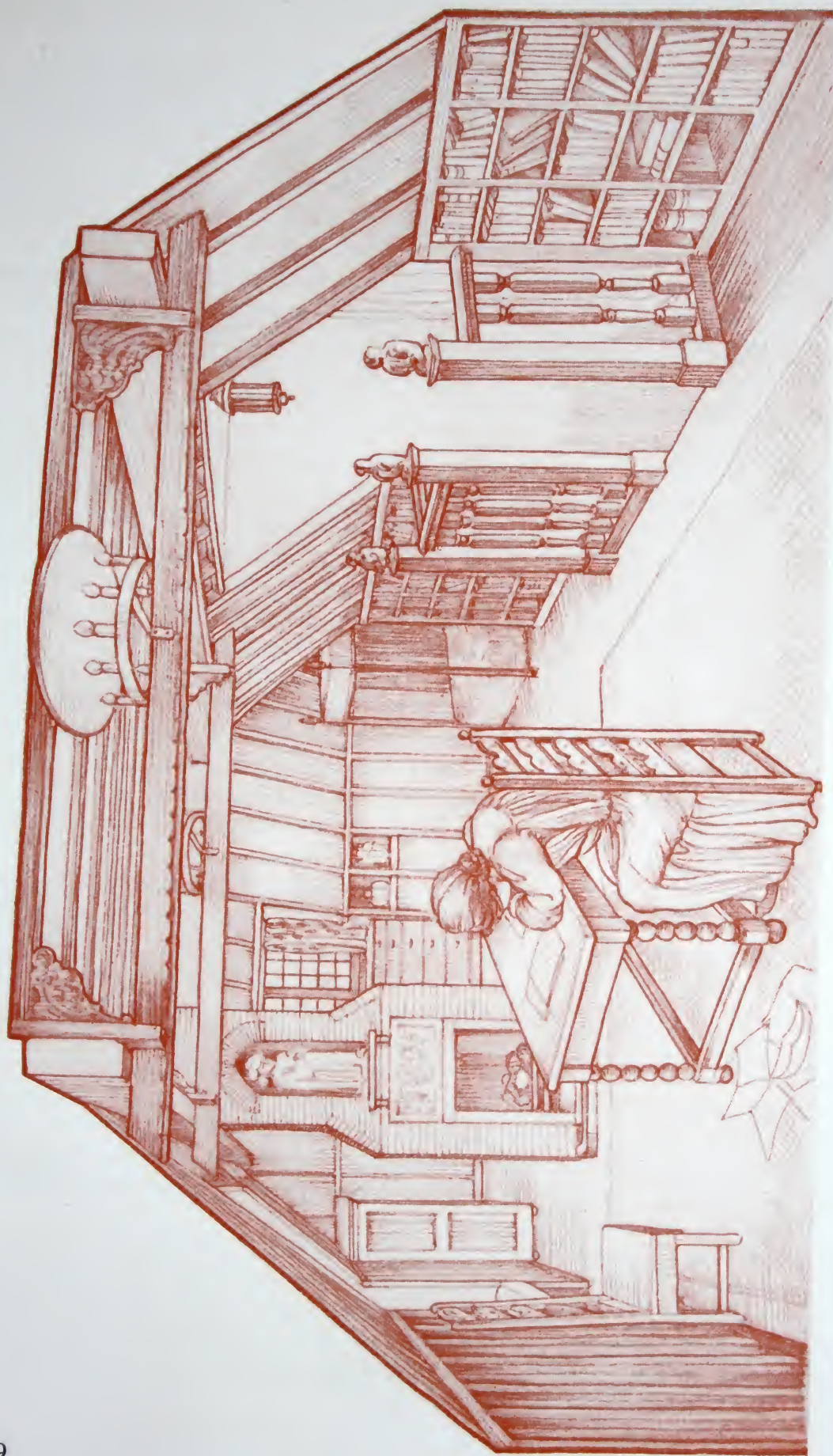
ATTIC NURSERY



A BACHELOR'S ATTIC



ATTIC SITTING ROOM



ATTIC STUDY

# COLOUR IN THE KITCHEN

GRACE LOVAT FRASER



KITCHEN planning for efficiency and ease of work is to-day a universally accepted principle. The layout of the working units, and the grouping of these to avoid unnecessary movement and loss of time are, in the modern kitchen, all the subject of careful thought.

But there is one aspect of kitchen planning which has received rather less attention than it deserves: the use of colour. Colour has a very great psychological effect, and the use of colour in any room, but especially in a room in which hard, exacting and very often nervy work has to be done, is extremely important. The modern factory realises the importance of colour and its psychological effect, not only on the well-being of people working there, but on the actual increase of efficiency. The kitchen is the housewife's workshop or family factory. It is in no way fanciful to say that good use of well-chosen colour is an imperative part of planning for full efficiency in a kitchen.

Certain colours reflect light, and others absorb it. Here is the first point which must be taken into consideration when planning a colour scheme for a kitchen. This does not mean, however, that nothing but white or creams can be used. We are past the stage where we feel that a kitchen which is almost clinical in its appearance is the ideal. The old-fashioned farmhouse kitchen approximates much more nearly to what a really good kitchen should be, and there is no reason why one should have to work in hard and forbidding surroundings. A certain degree of warmth, friendliness and even cosiness is a definite help to efficient work.

The first surfaces which must be thought of in planning any workshop are the walls and ceilings. Not only do they form the background for the fittings and details, but they also regulate the amount and quality of light. Therefore, light-reflecting colours should be used on these surfaces—that is, colours which do not absorb too much light. Again, considerable help can be given by using a slightly polished finish instead of matt, as the former reflects and increases light. This is almost always necessary in a town kitchen, where the light admitted is often dimmer, and the windows smaller, than in the country, and where the actual area of the room itself is often so small that it is desirable to give an illusion of greater spaciousness. For all these needs, a polished surface is the most useful. It can be obtained either by tiling, by the use of plastic sheeting, or, more easily, by either varnished paint or paint which has an eggshell gloss finish. All such surfaces are also more resistant to steam and dirt, and more easily kept clean and fresh.

Not only should the walls and ceiling reflect as much light as possible, but the choice of colour will also affect the actual quality of the light. In a room which gets warm light—that is to say a southern or western exposure, obviously cool, light-reflecting surfaces such as white, or very pale blue, will give the necessary correction to the over-warm light admitted to the room. Rooms of northern or eastern exposures are better served by walls

of pale ivory, cream, lemon yellow, or even a very faint peach pink. All these pale colours are as practical as white, and absorb very little more light, so that it is not always necessary to have a completely harsh white background, which easily becomes depressing. Nor do these very pale colours obtrude themselves sufficiently to become insistent, or to dominate the scheme. They are as good background colours as either white or ivory, and if they are of a sufficiently pale tone, can be used as backgrounds for many other brighter and sharper tones.

We are, thank goodness, past the era in which dark paint was considered the *sine qua non* for kitchen premises, when the incredible point of view was held that dark paint would not show the dirt. The housewife today *wants* the dirt to show, so that she can get rid of it—at least she should. Therefore, woodwork in a kitchen, doors, surrounds, fitted cabinets, and so on, should be treated with rather bright and gay colours. It is important that the very best quality of paint that can possibly be afforded should be used on these surfaces, so that they will stand up to being kept in an immaculately fresh condition. Given the right quality of paint, as bright or as light colours as desired may be used in these positions, and as good and hard a surface obtained as from the more depressing drab greens and chocolate browns of our grandmothers.

In planning a colour scheme for a kitchen, two things should be borne in mind—pale coloured walls and ceiling to reflect light and increase space ; and bright, gay colours for woodwork and accessories to give the stimulus which makes work fast and pleasurable. To these should be added some note of actual fantasy to relieve the workshop atmosphere, and to give a feeling of friendliness. The choice of gaily coloured curtains, either plain or patterned, is the best way of doing this. But if a patterned material is chosen, care should be taken that the design is neither too big nor too insistent—in fact, a very good plan is to have two quite different sets, so that one can completely change the character of the room at will. A cool plain coloured material for summer, and a brighter, gaily patterned one for winter are ideal. This is a counsel of perfection not easily followed at the present moment, but worth remembering for the future when material will be more easily obtainable.



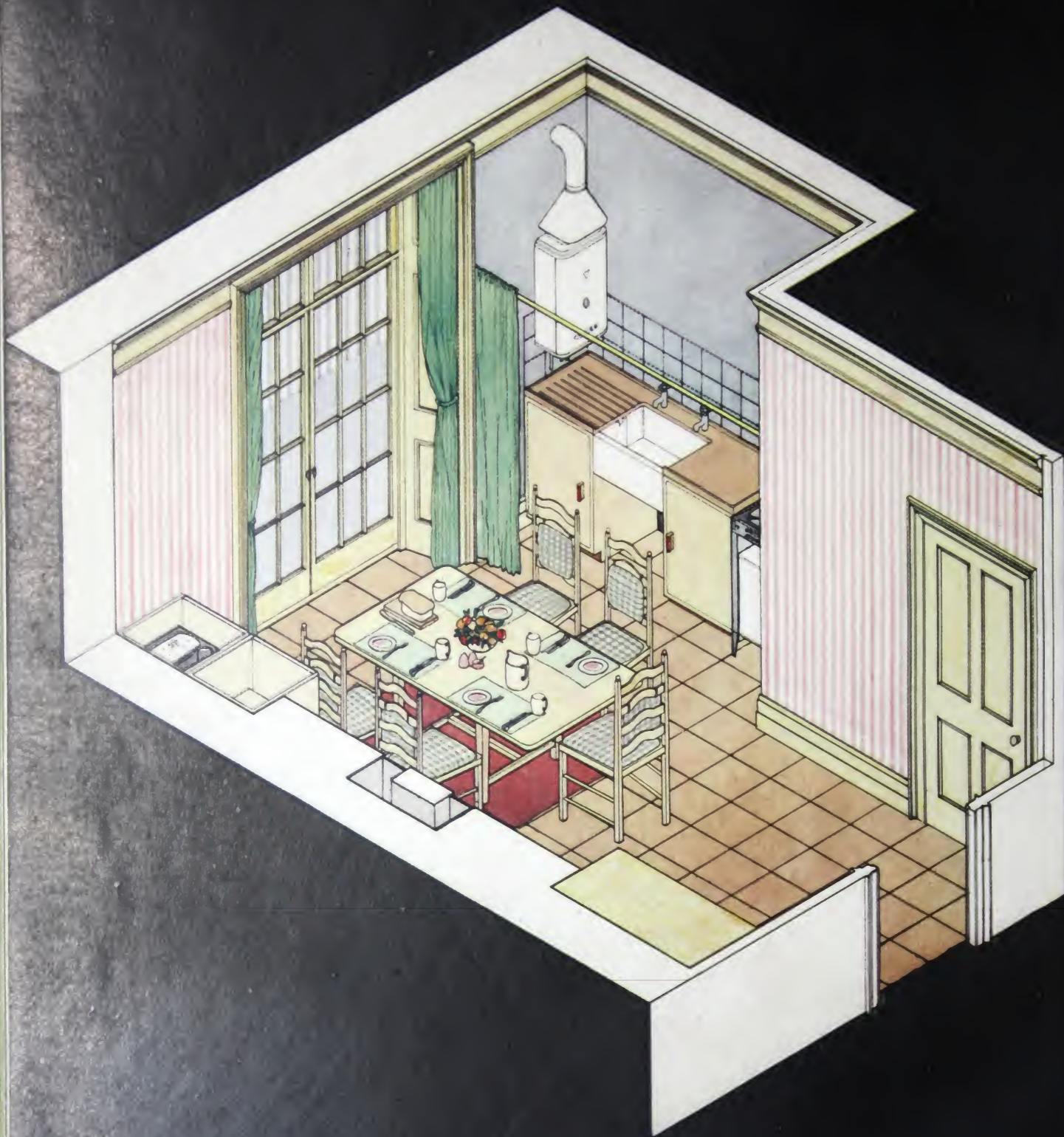
COLOUR SCHEME FOR KITCHEN IN CONVERTED HOUSE

ALMA DICKER, A.R.I.B.A.



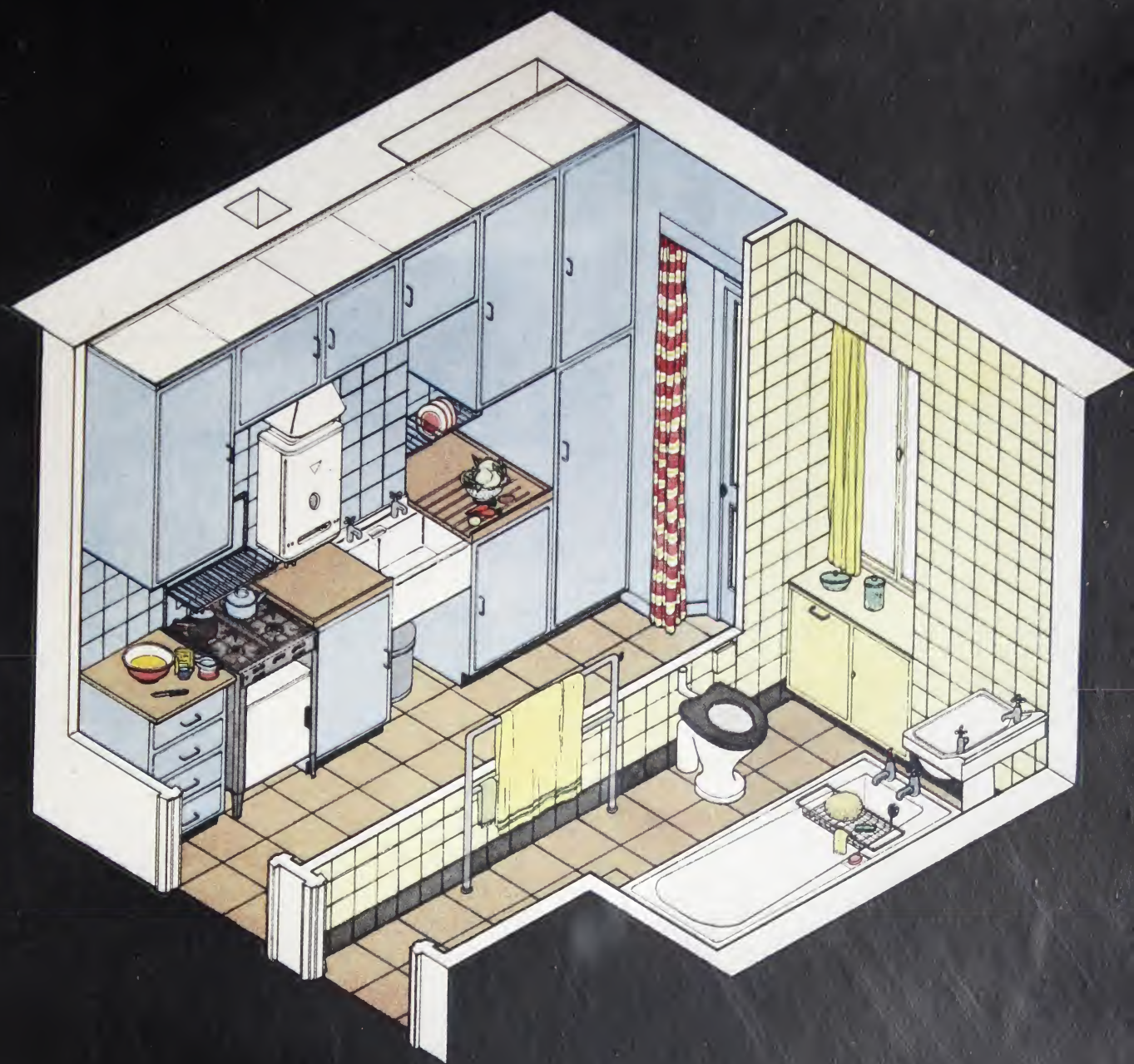
COLOUR SCHEME OF AN EXISTING BATHROOM CONVERTED INTO A KITCHEN

ALMA DICKER, A.R.I.B.A.



COLOUR SCHEME FOR KITCHEN-DINING ROOM

NANCY GREY



COLOUR SCHEME FOR AN EXISTING ROOM CONVERTED INTO A KITCHEN AND A BATHROOM NANCY GREY  
185

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CCA

# HOT WATER SERVICES IN FLAT CONVERSION WORK

BY THE TECHNICAL STAFF OF ASCOT GAS WATER HEATERS, LTD.



OF the many factors requiring careful consideration when carrying out the conversion of large old-fashioned houses into flats, the provision of an adequate and easily controlled hot water supply is among the most important.

A feature of this type of conversion is the fact that the existing plan and layout must control the ultimate arrangement of the new flats. In the majority of cases grouping of the hot water consuming points becomes difficult or impossible. Often, too, the space available is the absolute minimum, and cupboard accommodation cannot be sacrificed for large water storage containers. The instantaneous type of water heater, which is of compact design, is therefore particularly suited to such conditions.

## SELECTION OF APPLIANCES

Full multi-point service can be provided, the heater being fitted in the most convenient position (usually in the kitchen) and serving through pipe work the bath, lavatory basin, and kitchen sink. It sometimes happens, however, that the bathroom is necessarily situated at a considerable distance from the kitchen and other draw-off points. In these circumstances it is perhaps more economical, and will certainly give better service to provide a single point bath heater, fitted in the bathroom, delivering hot water through a swivel spout both to the bath and the lavatory basin; and a sink heater to serve the kitchen for all normal washing purposes.

Particulars required at the planning stage for the various types of Ascot Gas Water Heaters are given in Table I.

Dimensions are shown on pages 208-215.

## SUPPLIES

### COLD WATER SUPPLIES

It is desirable so to arrange the cold water supply as to minimise variations in water pressure, and for this reason a gas water heater having an automatic valve should not be fitted to a cold down-service used for other purposes, or to a rising main where the pressure of the supply fluctuates widely. This last condition sometimes occurs in the more remote areas of supply, or where water is pumped directly into the mains. Little or no difficulty occurs with mains where the supply is by gravity from a water tower. It is, however, pre-

TABLE I				
ASCOT GAS WATER HEATER TYPE	NEA 32/6	SG 32/1	R 12/4	RS 52/1
DESCRIPTION	Multi Point Heater	Single Point Bath Heater	Single Point Sink Heater	Single Point Sink Boiling Water Heater
PURPOSE	Bath, Basin and Sink	Bath and Basin or Bath only	Sink only	Sink only
WATER SUPPLY	Main or Tank	Main or Tank	Main	Main
*MINIMUM HEAD OF WATER	10-12'	8-10'	15'-20'	15'-20'
WATER CONNECTION				
COLD	$\frac{3}{4}$ " Male B.S.P. Taper	$\frac{1}{2}$ " Male B.S.P. Taper	$\frac{1}{2}$ " Male B.S.P. Taper	$\frac{1}{2}$ " Male B.S.P. Taper
HOT	$\frac{3}{4}$ " Male B.S.P. Taper	—	—	—
GAS CONNECTION	$\frac{3}{4}$ " Male B.S.P. Taper		$\frac{1}{2}$ " Male B.S.P. Taper	
FULL SPECIFICATION ON PAGE	208	210	212	214
* According to length of run, size of pipe, and number of bends in system.				

ferable to connect each instantaneous water heater to a separate down-service fed from the cold water supply tank in the roof. If, for any reason, this is not possible, a common down service may be used, but the pipe sizing must be carefully graded so as to ensure an equal flow at each appliance. The minimum head necessary to operate the automatic valves is shown in Table I, and where this is unobtainable, appliances on the top floor may have to be connected directly to the rising main. Before such connections are made it is desirable to discuss the matter with the gas undertaking and the water supply authority.

The dimensions of the connections for water supplies are given in Table I above. Where two or more appliances are fed from a common supply this pipe must be graded, as shown in Table II.

In order to facilitate servicing, and to allow the water heaters to be drained as a precaution against damage by frost, stop-cocks—of pattern approved by the water authority, and with the jumper free to rotate and secured to lift with the spindle—should be fitted in the cold-water supplies close to the appliances.

#### HOT WATER SUPPLIES

There is not at present any statutory regulation covering all water installations throughout the country, and individual water supply authorities may have special regulations, details of which can be obtained on enquiring locally or through the Ascot Organisation. A number of authorities stipulate that the distance between any hot water tap and the water-heater shall not exceed 25 ft. measured along the pipe connecting the two points. Greater or less maximum lengths may be allowed in some cases. Where longer runs are unavoidable,

WATER PIPE SIZES FOR  
COMMON DOWN SERVICES

TABLE II

ASCOT GAS WATER HEATERS,  
TYPES NEA 32/6 & SG 32/1

No. of Floors	Ground to First	First to Second or to tank if sufficient head and heater not on main*	Second to Third or to tank if sufficient head and heater not on main*	Third to Fourth or to tank if sufficient head and heater not on main*	Fourth to Tank if sufficient head and heater not on main*
	inches	inches	inches	inches	inches
5	$\frac{1}{2}$	I	$I\frac{1}{4}$	$I\frac{1}{2}$	$I\frac{1}{2}$
4	$\frac{1}{2}$	I	$I\frac{1}{4}$	$I\frac{1}{2}$	—
3	$\frac{1}{2}$	I	$I\frac{1}{4}$	—	—
2	$\frac{3}{4}$	I	—	—	—

\*If less than 10 ft. measured from the highest draw-off point to the level of water in the tank in the case of the multi-point, or less than 8 ft. measured from the spout to the level of water in the tank in the case of the bath heater on the top floor, then the heaters on this floor only may be connected to the main. With Multi-point installations the hot water draw-offs should be run in  $\frac{3}{4}$  in. pipe and  $\frac{1}{2}$  in. branches up to a total of 10 ft. run may be taken to the basin and sink.

WATER PIPE SIZES FOR  
INDIVIDUAL DOWN SERVICES

TABLE IIa

ASCOT GAS WATER HEATERS,  
TYPES NEA 32/6 & SG 32/1

Length of Pipe Run in feet*	MINIMUM AVAILABLE WATER PRESSURE				
	TANK SUPPLY		MAIN SUPPLY		
	Feet Head		Lb./sq. in.		
	10-25	25-40	10-30	30-50	Over 50
	inches	inches	inches	inches	inches
Up to 25	$\frac{3}{4}$	—	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$
25 to 50	I	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{2}$
Over 50	I	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$

\*The pipe run includes both cold water supply and hot water draw-off in the case of the NEA 32/6 and  $\frac{1}{2}$  in. branches up to a total of 10 ft. run may be taken to the basin and sink. The pipe sizes refer to the cold water supply only in the case of the SG 32/1.

these authorities require the tap to be connected to a secondary flow-and-return system to obviate waste of water.

Instantaneous gas water heaters cannot be fitted to serve secondary circulations, and where more than 25 ft. of pipe is required to serve an isolated point it would be necessary to provide a bath heater in the bathroom for the bath and basin, and a sink heater to serve the kitchen sink, as described on page 187.

In some cases, it may be found possible to make use of existing hot water pipe work, but before doing so an examination must be carried out to ensure that satisfactory service will be obtained. The pipe work must be in good condition and reasonably free of scale. All dead lengths of pipe, secondary circulations, storage tanks and expansion pipes have to be properly sealed off from the proposed system. Failure to do this would cause exceedingly erratic operation of the water heater with considerable inconvenience to the tenant. If the original pipe work is in lead and the water heater is to be connected to the main water supply, it should first be ascertained that the pipe is of correct weight to withstand hot water at mains pressure.

#### GAS SUPPLIES

The layout of the gas carcassing must make due allowance for all gas-burning appliances in each apartment. In a house to be converted into flats it will generally be found that a common gas service may be run in the stair-well, with branches taken off to individual flats. This common service should be of such size that an adequate gas supply is available to all the flats at all times, and that the operation of appliances in one flat does not cause serious fluctuations in gas pressure in other parts of the building. Each flat will

TABLE III  
GAS SUPPLY PIPE SIZES FOR  
ASCOT INSTANTANEOUS GAS WATER HEATERS

Length of Pipe Run from Meter in feet	APPLIANCE TYPES	
	NEA 32/6, SG 32/1	R 12/4, RS 52/1
	inches	inches
Up to 15	$\frac{3}{4}$	$\frac{1}{2}$
15-30	1	$\frac{3}{4}$
Over 30	$1\frac{1}{4}$	1

require its individual meter, which should be of sufficient capacity to deal with the consumption of all the gas appliances in the flat should they be in operation at the same time.

Internal piping from the meter must also be sized adequately to supply all gas appliances in the apartment, and, as the water heater is likely to have the largest consumption rate, its supply should be taken off nearest the meter. Branches tapped off the water heater supply to other appliances should also be avoided. The size of the gas supply pipe will, of course, be dependent upon the length of run, but, as a guide, it may be taken that  $\frac{3}{4}$  in. pipe for multi-point and bath heaters, and  $\frac{1}{2}$  in. pipe for sink heaters is generally suitable in the normal installation in flats. Table III gives sizes to be adopted for various runs of pipe. Provision for a gas stop-cock should always be made in the gas supply, close to the water heater, to facilitate maintenance.

During the planning stage of a conversion, assistance must be sought of the local gas undertaking to obtain expert advice on the carcassing and the installation of all gas appliances.

## FLUES

All bath and multi-point instantaneous gas water heaters require an adequate flue installation to discharge the products of combustion to the open air. Due consideration, therefore, must be given to the provision of such flues when planning a conversion. Sink heaters, by virtue of their comparatively low gas rate and the fact that they are only used intermittently and over short periods, do not normally require a flue, unless fitted in exceedingly confined quarters or run continuously for long periods.

## GENERAL CONSIDERATIONS

Before dealing with the detailed construction of flues, it is advisable to consider the fundamental principles to be followed if a satisfactory flue installation is to be obtained.

As the amount of residual heat in the products of combustion discharged from a modern, high-efficiency, instantaneous gas water heater is small, every endeavour should be made when designing the flue to avoid unnecessary losses of energy, which would cause a reduction in the velocity of the flue gases, and consequent loss of efficiency of the flue. These losses of energy occur in long runs of horizontal flue, and where the flue makes sharp changes of direction. Such horizontal lengths and sharp bends should therefore be avoided wherever possible.

In cases where, owing to the construction of the building, a flue has to have several bends or long horizontal runs, additional height of vertical flue may be necessary to overcome the inevitable resistance. This vertical flue should be installed immediately preceding the horizontal run, or bend, and, as a rough guide, there must be at least one foot of vertical flue for every foot of horizontal flue or bend.

In setting out the flue it is desirable to have the greatest possible vertical rise immediately above the appliance, and even a foot of vertical at this point is better than an immediate bend through a wall. The rising character of the flue should at all costs be preserved, and where no vertical rise is possible an inclined flue is preferable to a horizontal run.

#### SIZE OF FLUE

The size of the flue is governed by the diameter of the outlet socket on the water heater and the following table gives the necessary dimensions for Ascot Gas Water Heaters :

TABLE IV FLUE SIZES FOR ASCOT INSTANTANEOUS GAS WATER HEATERS			
TYPE OF APPLIANCE	OUTLET SOCKET INTERNAL DIAMETER	INTERNAL DIAMETER ASBESTOS CEMENT FLUE PIPE	NOTES
	inches	inches	
NEA 32/6	5 $\frac{5}{8}$ to 5 $\frac{1}{4}$	5	Smaller diameter in flue socket is to provide for 5" internal diameter vitreous enamelled flue pipe, if used
SG 32/1	5 $\frac{5}{8}$ to 5 $\frac{1}{4}$	5	
R 12/4	3 $\frac{1}{2}$	3	Flue not normally required, special Draught Diverter supplied as extra, see page 191
RS 52/1	3 $\frac{1}{2}$	3	

#### TERMINATION OF FLUES

Compared with the velocity of a high wind, the velocity of flue gases is very low, so that any flue into which a strong wind can blow directly would be subject to down-draught. The position and type of the flue terminal are therefore matters requiring close attention when planning a flue installation.

Undoubtedly the best position for the termination of the flue is above the highest point of the building, and where flues are run up the outer wall of the building, they should finish well above the eaves and preferably level with or above the ridge of the adjoining roof. Where there is a flat roof, the flue must rise above the parapet and be kept at least 6 ft. away from any higher adjoining premises.

Where it is difficult to carry a flue above the eaves, it may be terminated on the wall-face by means of a suitable terminal, designed to prevent direct down blow of the wind. Flues must never be allowed to discharge through an ordinary wall-grating or air brick.

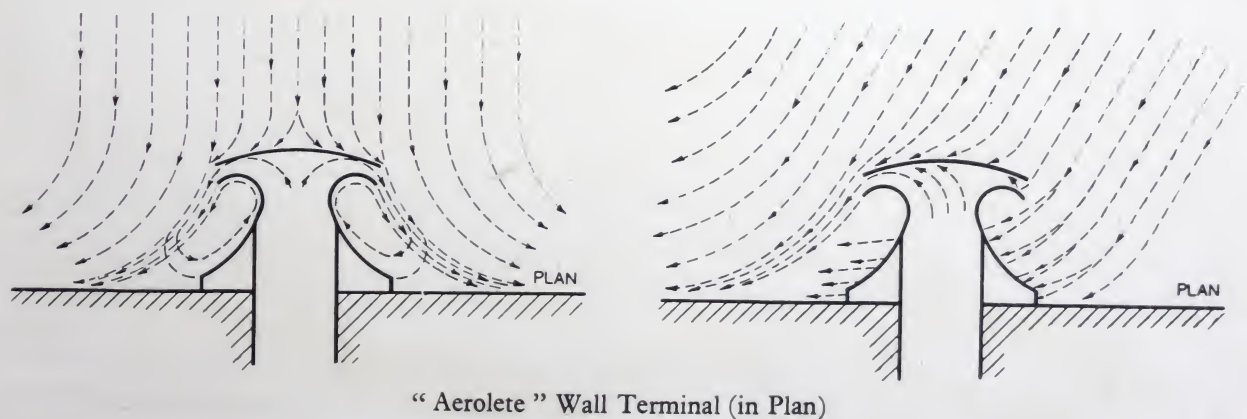
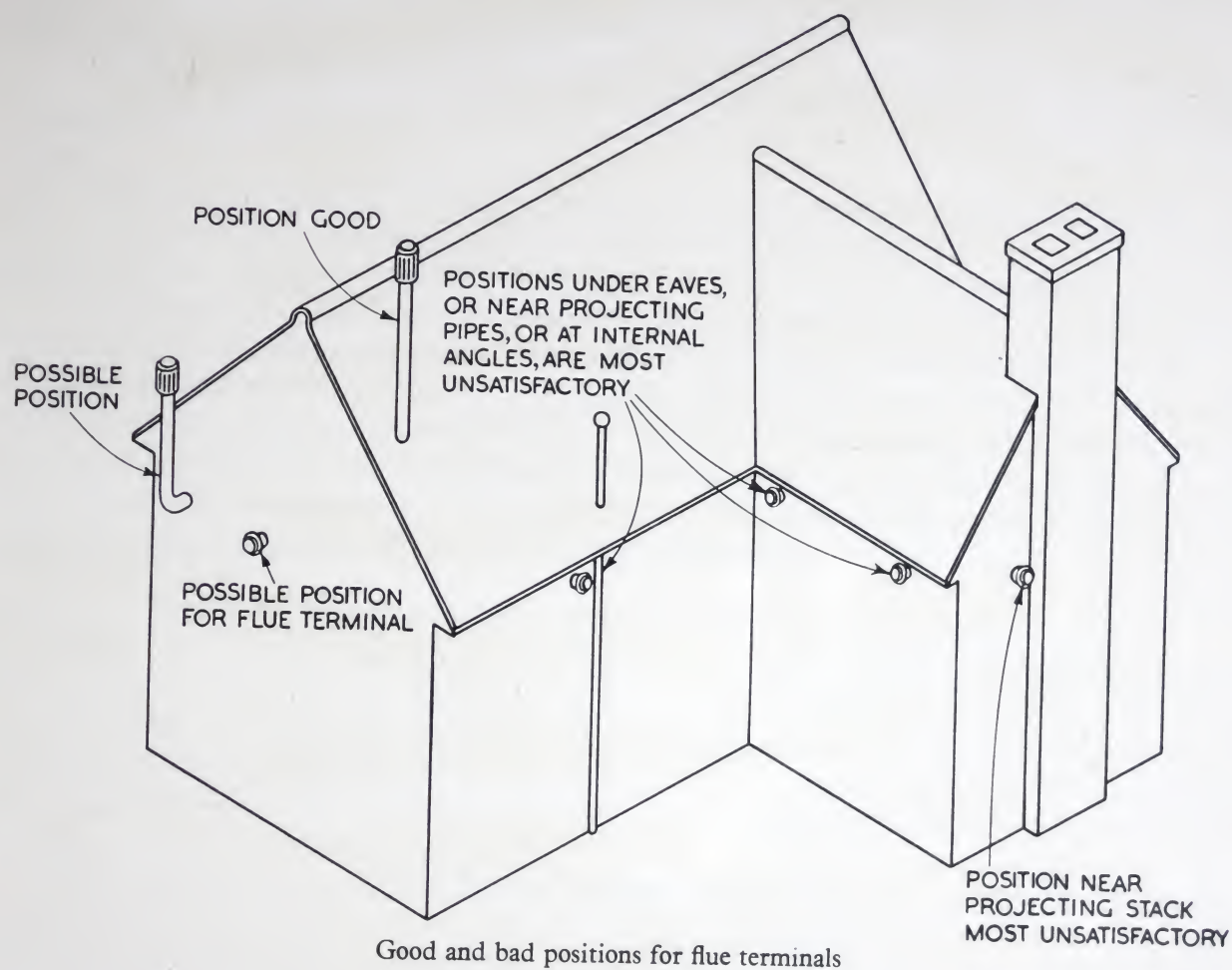
No terminal should ever be placed in any re-entrant angle beneath the eaves or against a projection or soil pipe, since high winds tend to build up pressure at such points and will prevent the evacuation of the flue gases. The worst case of all is the re-entrant angle of a building having external balconies. Indeed, in such buildings, flues should always be carried direct to the roof level, for, apart from high external air pressures which may be set up, the terminals tend to be broken or are obstructed by the tenants.

#### TERMINALS

A properly designed terminal is essential for every flue, and there are a great many proprietary types available on the market. In selecting a particular make it should be noted that the outlet area of the terminal is not to be less than the area of the flue to which it is

attached, and no terminal can be guaranteed in all positions and in all atmospheric conditions to prevent down-draught.

In cases where the flue is to be terminated on the wall-face, a terminal, designed to utilise the flow of the air stream past or through it to assist in the evacuation of flue gases, should be chosen, e.g. a "Ventile" or an "Aerolete."



## DRAUGHT DIVERTER

Since short periods of down-draught may occur during windy weather in any flue, it is necessary, and a legal obligation, to fit a baffle or down-draught diverter in the flue above the appliance and in the same room. All Ascot appliances requiring a flue for normal operation are fitted with such a draught diverter (*forming an integral part of the appliance*), and no additional baffle must ever be fitted.

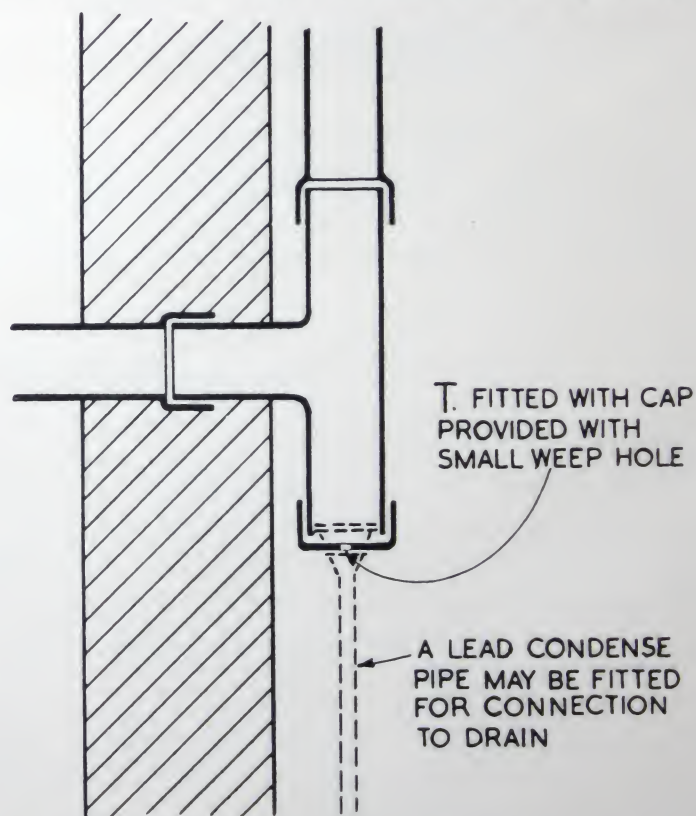
In the very exceptional cases when an Ascot Sink Heater is to be fitted with a flue, a special draught diverter may be obtained to fit on the top of the appliance in place of the normal top cover.

## CONDENSATION

Water vapour forms a large proportion of the products of combustion, and some of it will condense in the flue if the temperature falls sufficiently. It is necessary, therefore, when designing and laying out flues, to consider the disposal of this condensate. Unless care is taken, staining of decorations, and possibly even more serious damage, may occur.

The whole of this water vapour can be evacuated if sufficient residual heat is left in the flue, and Ascot Gas Water Heaters are designed to reduce the risk of condensation in normally exposed and reasonably short flues. The risk of condensation is also reduced by the introduction, at the draught diverter level, of fresh dry air from the room in which the appliance is situated, but, it remains a fact that modern water heaters of relatively high efficiency must give rise to condensation in the flue under certain adverse operating conditions.

Long flues situated outside the building should be so designed as to allow the condensate, if any, to be run to a suitable drain. It is commonly possible to fit a tee at the bottom of a flue after it has passed through the wall. The lower end of this tee should be capped as an open end may give rise to back-draught in windy weather. The cap should be provided with a weep hole, and if the drip from this is likely to cause a nuisance, it may be led away to a suitable drain through a lead condense pipe. Such a condense pipe should be of not less than  $\frac{3}{8}$  in. internal bore, and arrangements should be made for clearing any rubbish which may fall down the flue. For this reason, it is best to connect it to the cap on the flue with a wiped joint and screwed plumbers' union.



Method of collecting and disposing of condensation from long flues.

Condensate may be discharged above the trap level of any domestic fitment (except soil fitment) or above the water level, over, or into, a trapped gulley, into a rain water head, eaves, gutter or rainwater pipe, provided this is not constructed of zinc. The condensate pipe must not under any circumstances be connected direct to any soil pipe or to the waste pipe of any sanitary appliance below the trap level. It should be run without sharp bends and must be fixed to drain dry so that there is no risk of damage during frost.

#### TYPES OF FLUE

Without doubt, completely built-in flues, preferably placed on internal walls and discharging above the roof level, are the best flue installation for instantaneous gas water heaters.

In conversion work generally, it will seldom be found possible to install built-in flues, owing to lack of space, structural difficulties and the considerable expense involved. External flues, therefore, will, in most cases be used, and should be planned as previously described.

Sometimes, use could be made of existing flues originally provided for open fires and kitchen ranges. There are, however, two objections to this. First, such flues are by no means always efficient even when used for their original purpose. Secondly, unless the flues are in the inner part of the house there may be excessive cooling with resulting condensation in the flue. The condensate may cause dampness and staining of the decorations, intensified by the soot possibly remaining in the flue. For these reasons, the use of existing solid fuel flues should be avoided and new flues provided.

#### CONTACT BETWEEN FLUE AND ADJOINING BUILDING MATERIALS

Where a flue passes through, or adjoins, any combustible building material, a space of not less than 1 in. between the surface of the flue and the nearest point of such a material is in fact sufficient. In some exceptional circumstances there may be other legal controls insisting on greater clearances. The temperature of the flue gases at the hottest point of a flue connected to an Ascot Gas Water Heater is low, but direct contact with wood, wall board, or paper is obviously undesirable.

The space between the flue and the adjoining material may, if required, be masked by a loose metal ring and, if necessary, the annular space may be caulked with asbestos or other suitable insulating packing to prevent draughts. Where a flue passes through any wooden casing, particularly the space above or behind a cupboard, this should be freely ventilated. Unless this is done, the inner surface of the casing may become drier than the outer, causing warping and cracking.

#### FRESH-AIR INLETS

It will be found in most examples of conversion that appliances have to be installed in rooms which were not originally designed to form part of the domestic offices of a dwelling. Indeed, in some extreme cases, additional small rooms have to be provided as bathrooms and are placed on the inside part of the building where no adequate means of ventilation exist.

Clearly, every part of the products of combustion passed up the flue must be replaced by an equal volume of fresh air. In old buildings, this replacement air can enter through

inevitable cracks in the building, particularly around the joinery of doors and windows and through cracks in the flooring. Wherever the room is small, however, and particularly a room in which a flueless sink heater is installed, a fresh-air inlet is necessary.

The positioning of this inlet may be difficult, if unpleasant draughts are to be avoided. Where an external air brick is to be used, a short length of duct carried upwards above head height in the room, in the manner of the well-known Tobin tube, is most satisfactory. Ventilators may be fitted above doors, and are particularly suitable for bathrooms having no window.

The size of an air intake should be not less than the cross-sectional area of the flue. Apart from the fresh-air requirements of the gas appliances installed in the kitchen, the fresh-air inlet would serve to assist in preventing cooking odours from permeating the flat.

## LOCATION OF APPLIANCES

In designing the layout of an installation, the location of the instantaneous gas water heater is a matter requiring a good deal of thought, if the maximum efficiency is to be obtained from the system. The most effective compromise of all the factors affecting water and gas supplies and flues will determine the ultimate location of the gas water heater. Bearing in mind all the factors, previously discussed under their relevant headings, the following is a summary of the points to be considered :

- (1) The appliance should be located as close as possible to the fitting it is to serve. In the case of multi-point appliances, this is as near as is practicable to the point having the most frequent use and requiring the hottest water.
- (2) The hot water draw-offs should be as short as possible, and in any case should not exceed the maximum length stipulated by the local water authority.
- (3) So as to avoid horizontal runs of flue pipe, the appliance should be installed directly under the flue.
- (4) For maintenance purposes, the appliance should be easily accessible.
- (5) The free flow of air for combustion purposes must be uninterrupted.

The best location for the multi-point gas water heater is therefore in the kitchen, as near as possible to the sink. In a large majority of conversions the flues, of necessity, will have to be external. The appliance, therefore, should be fixed on an outer wall or on a partition close to it, and as near as possible to the point of egress of the flue. Where the position of the flue is dictated by the design of the building, the location of the appliance should be such that horizontal lengths of flue pipe are reduced to a minimum, even at the expense of increasing the run of hot water draw-off to the kitchen tap.

Single Point bath heaters should be fixed so that they are able to supply both the bath and the basin without recourse to unwieldy lengths of outlet spout. Sink heaters, of course, will be installed close to the sink, and usually there will be no need to consider the location of the appliance with regard to a flue.

Instantaneous Multi-point gas water heaters must never be installed in a bathroom, as a hot tap in another room can set the appliance in operation while someone is in the bath. If the ventilation of the bathroom is poor and the flue of the appliance subject to back-draught, a very uncomfortable atmosphere would result.

## MATERIALS

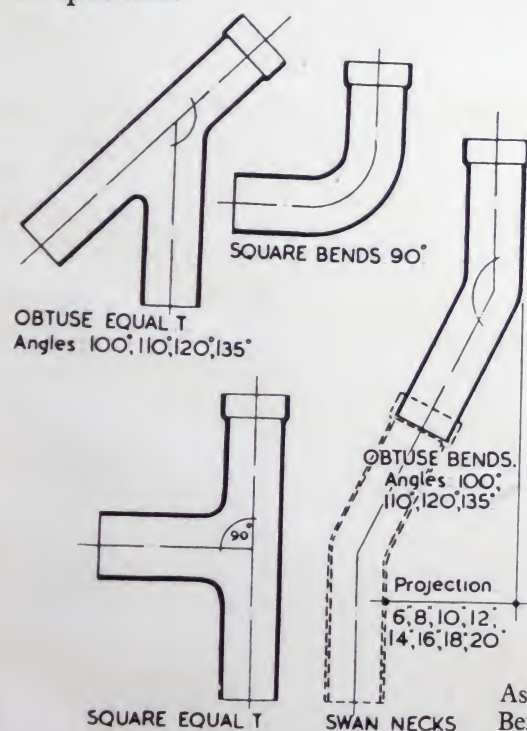
In specifying the materials to be used for carrying out the installation, reference should be made to the current British Standard Specifications.

### FLUE PIPES AND FITTINGS

The best flue for gas water heaters is asbestos cement of circular section. See British Standard Specification No. 567.1945. The principal dimensions of flue fittings to this specification are given in Table V.

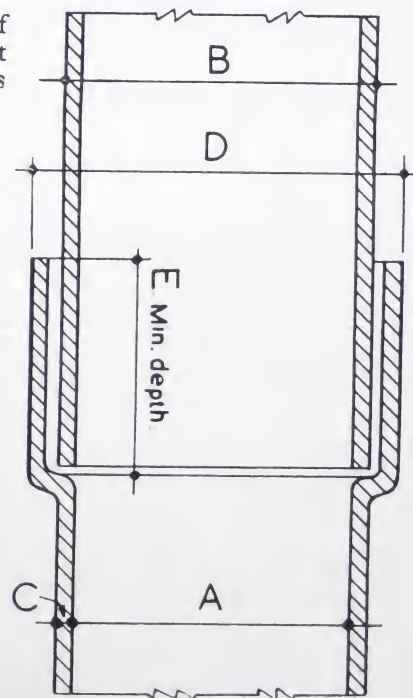
TABLE V. ASBESTOS CEMENT FLUES															
Dimensions (in inches) of Straight Pipes and Sockets															
PIPE	Internal Diameter	A	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
	External Diameter	B	2¾	2¾	3¾	3¾	4¾	4¾	5¾	6½	7¾	8¾	9¾	10¾	13
	Thickness	C	⅜	⅜	⅜	⅜	⅜	⅜	⅜	½	⅝	⅝	⅝	⅝	¾
SOCKET	Overall Diameter	D	3	3½	4	4½	5	5½	6	7½	9	10	11	12	14½
	Internal Depth, min.	E	2	2	2	2	2	3	3	3	3½	3½	3½	3½	3½

Where an asbestos cement flue is to be placed wholly out of doors and there is considerable risk of condensation, some deterioration of the flue may occur due to sulphates in solution in the condensate. Under such conditions, similar flues made with aluminous instead of Portland cement are considered to be more resistant to disintegration, and can be specified.



Asbestos Cement  
Bends and Tees.

Dimensions of  
Asbestos Cement  
Pipes and Sockets  
(see Table V).



## METAL FLUES

For work entirely under cover, metal flues are sometimes used, although the risk of corrosion is considerable. It is found that galvanising provides no protection under these conditions, and metal should always be coated with porcelain enamel inside and out. Metal flues should not be used where they have to be built-in behind permanent work or joinery of any type. Bends in metal flues should always be of a smooth welded type or the so-called lobster or crimped type. Square bends are inadmissible.

White vitreous enamelled metal flues, with the joints masked with chromium-plated bands, are very attractive for internal work where high-class installations are required.

## WATER AND GAS PIPES AND FITTINGS

### GAS

The gas supply should be run in iron or copper pipe.

### COLD WATER

The cold water supply can be run in copper, iron or lead, depending on the nature of the water supply and the requirements of the Local Water Authorities.

### HOT WATER

The hot water draw-offs should be run in copper or iron. If local conditions demand it lead may have to be used, but it is essential that it should conform to the British Standards Specifications listed in Table VI.

Water taps and stop-cocks must be of a pattern approved by the Local Water Authority. Loose jumper stop-cocks should be avoided as they are likely to give rise to water-hammer; the jumpers should be pinned, free to rotate and lift with the spindle.

TABLE VI		
PIPES, FITTINGS AND FLUES	BRITISH STANDARDS SPECIFICATIONS	
	MATERIAL	SPECIFICATION NO.
Light Gauge Copper Tube	Copper	B.S.S. 659-1944
Copper Tubes	Copper	B.S.S. 61-1913*
Capillary and Compression Fittings for use with copper tube	Good Quality Brass	B.S.S. 864-1945
Copper Alloy Screwed Pipe Fittings	Copper	B.S.S. 99-1922
Copper Alloy and M.C.I. Pipe Fittings	Copper or Malleable Cast Iron	B.S.S. 143-1938
Iron Pipes and Tubulars	Mild Steel	B.S.S. 789-1938
	Wrought Iron	B.S.S. 788-1938
Lead Pipes	Lead	B.S.S. 602-1939
	B.N.F. Ternary Alloy No. 2	B.S.S. 603-1941
		B.S.S. 1085-1943
Water Cocks and Taps	Good Quality Brass	B.S.S. 1010-1942
Flue Pipes and Fittings	Asbestos Cement	B.S.S. 567-1945
	Sheet Metal	B.S.S. 715-1936
Flue Terminals	—	B.S.S. 766-1938
* Under revision.		

## INSTALLATION

### PIPE FITTING

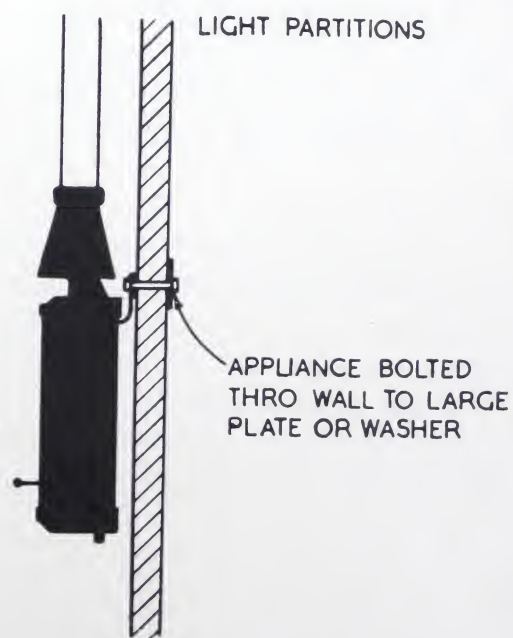
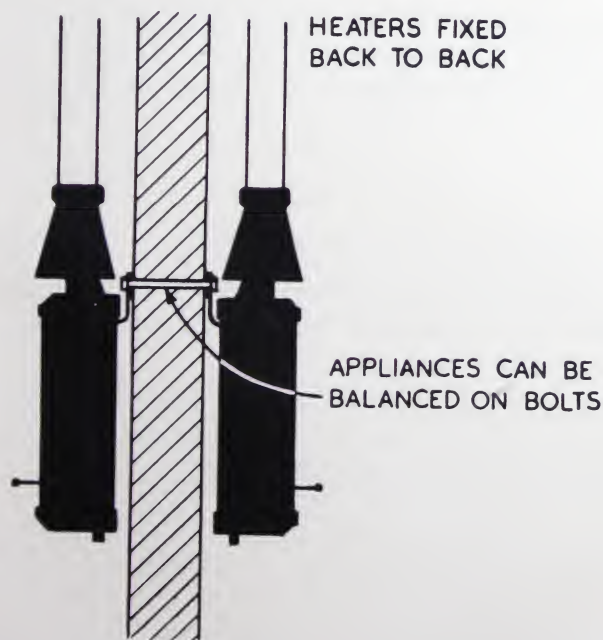
Owing to the very nature of conversion work, it may be impossible to employ many of the methods used in new construction to achieve a neat and attractive installation. It will usually not be possible to run the pipes in chases or specially constructed ducts, owing to the need for the minimum disturbance of the existing building fabric. Great care is therefore necessary, when running surface pipe work, to achieve a neat installation, as apart from the ugly appearance, untidy pipe work is usually inefficient. The architect can ensure neater and cheaper installation if the co-operation of the appliance manufacturer and plumber or fitter is sought in the early stages.

Common down-services should be run to pass as close to the appliance as possible. Hot and cold water pipes and gas pipes should be secured neatly by means of clips or wall plates.

### FIXING OF ASCOT GAS WATER HEATERS

Ascot instantaneous multi-point and bath heaters are provided with two  $\frac{3}{4}$  in. wide slots in the back panel and two fixing brackets are supplied with each heater. For normal fixing on outside walls the grouting bolts provided should be used, cemented-in, or, alternatively, the brackets may be employed secured to the wall by coach bolts and plugs or one or other of the proprietary fibre or metallic inserts. If, however, the appliances are to be fixed to light partitions of breeze or other blocks, then plugging is usually inadequate, and bolts through the partition having a large washer or plate on the far side are to be preferred. Economy in both pipe work and fixing can be achieved in cases where appliances are installed back to back. In such cases, the heaters may be hung on bolts traversing the partition.

Heaters fixed to lath and plaster partitions also require additional support, other than that afforded by normal hanging brackets. Two wooden battens, firmly secured horizontally



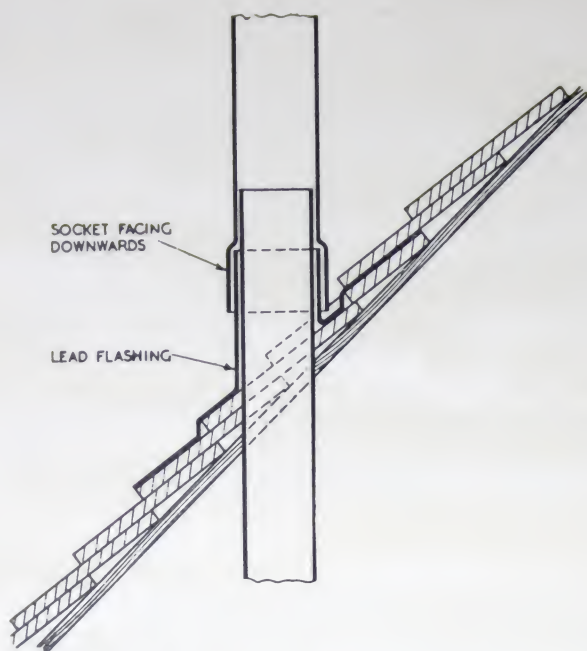


Diagram showing method of carrying a flue through the roof.

INTERNALLY: JOINT IN FLUE PIPE SHOULD BE MADE WITH THE SOCKETS UPWARDS

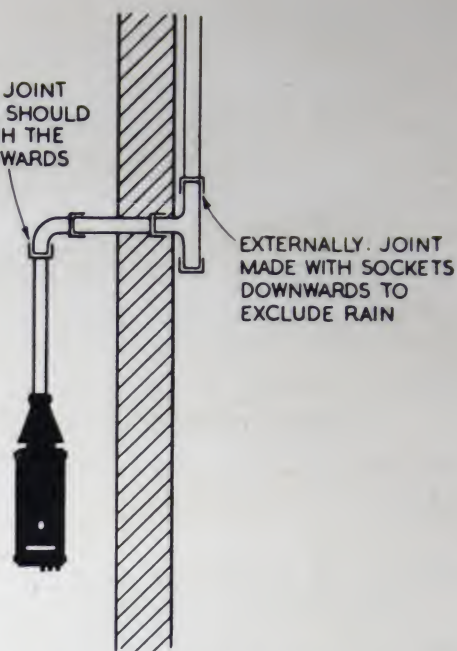


Diagram showing method of setting up joints in flue pipe.

to solid parts of the partition, one at the top and one at the bottom of the appliance, are usually found to be adequate.

Sink heaters are comparatively light in weight and are supported on the pipe fittings. The use of an elbow union wall plate on the cold water inlet facilitates this. A top fixing clip is provided to serve to steady the appliance.

#### FIXING OF FLUES

Flues should be fixed by means of holder batts and suitable clips supplied by the manufacturers. The flue pipe should be firmly fixed, at regular intervals, to the fabric of the building, and should be installed in such a way that the weight of the flue is not carried by the appliance and its fixings.

#### JOINTS IN FLUES

In all work within the building, flue pipe, whether of asbestos cement or metal, must be fixed with the socket upwards to prevent any condensation running out and marking the decorations. Flue pipes fixed wholly externally have commonly been fixed with socket downwards to prevent the rain running in through the pointing.

Joints may be made in asbestos yarn pointed with heat-resisting compound supplied by the pipe makers; alternatively, weak cement and sand or cement lime and sand mortar may be used. Strong or neat cement will crack, and is therefore undesirable.

PHOTOGRAPHS OF  
FIVE ASCOT GAS  
WATER HEATERS

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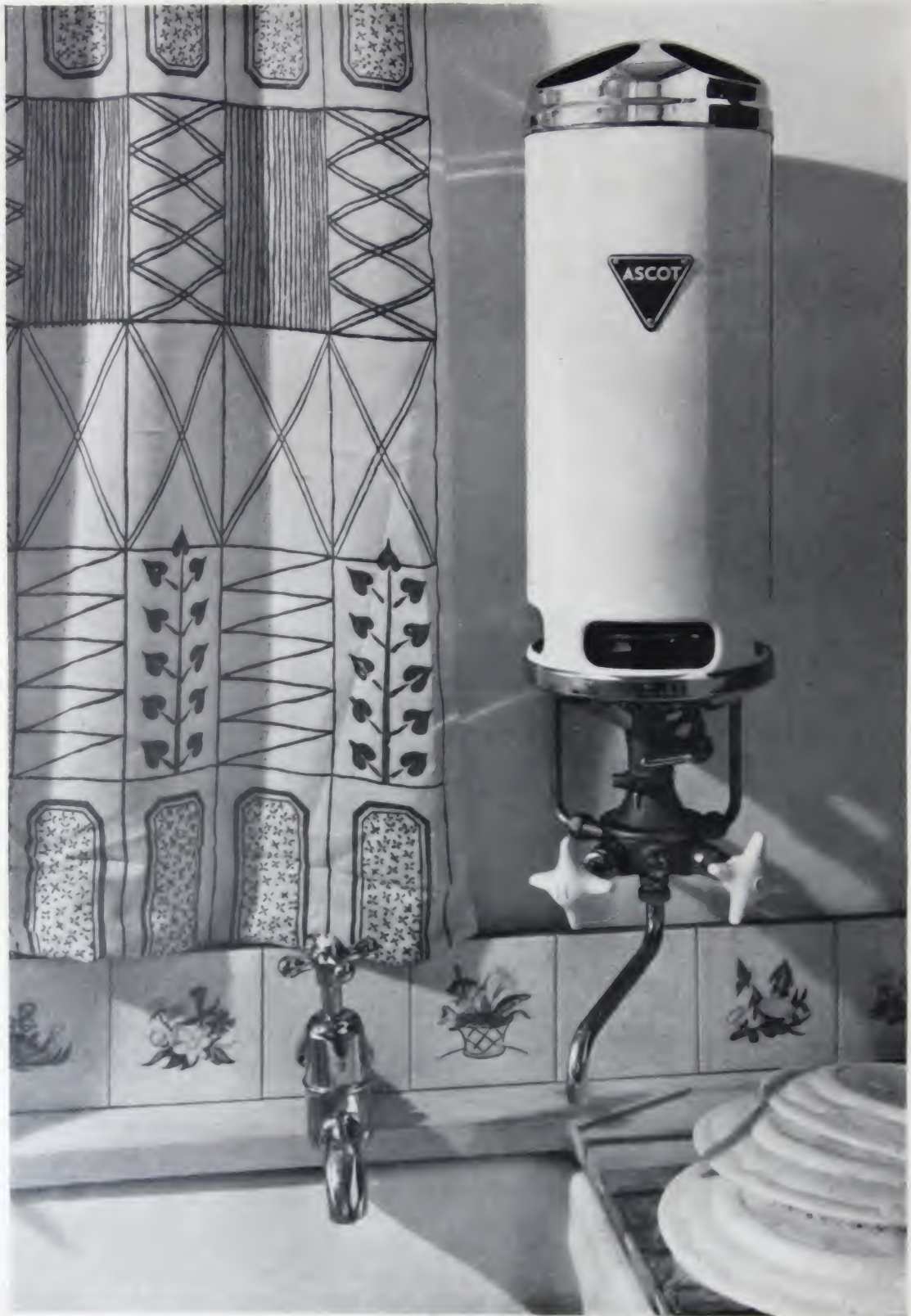
TYPE NEA 32/6

ASCOT INSTANTANEOUS MULTI-POINT GAS WATER HEATER



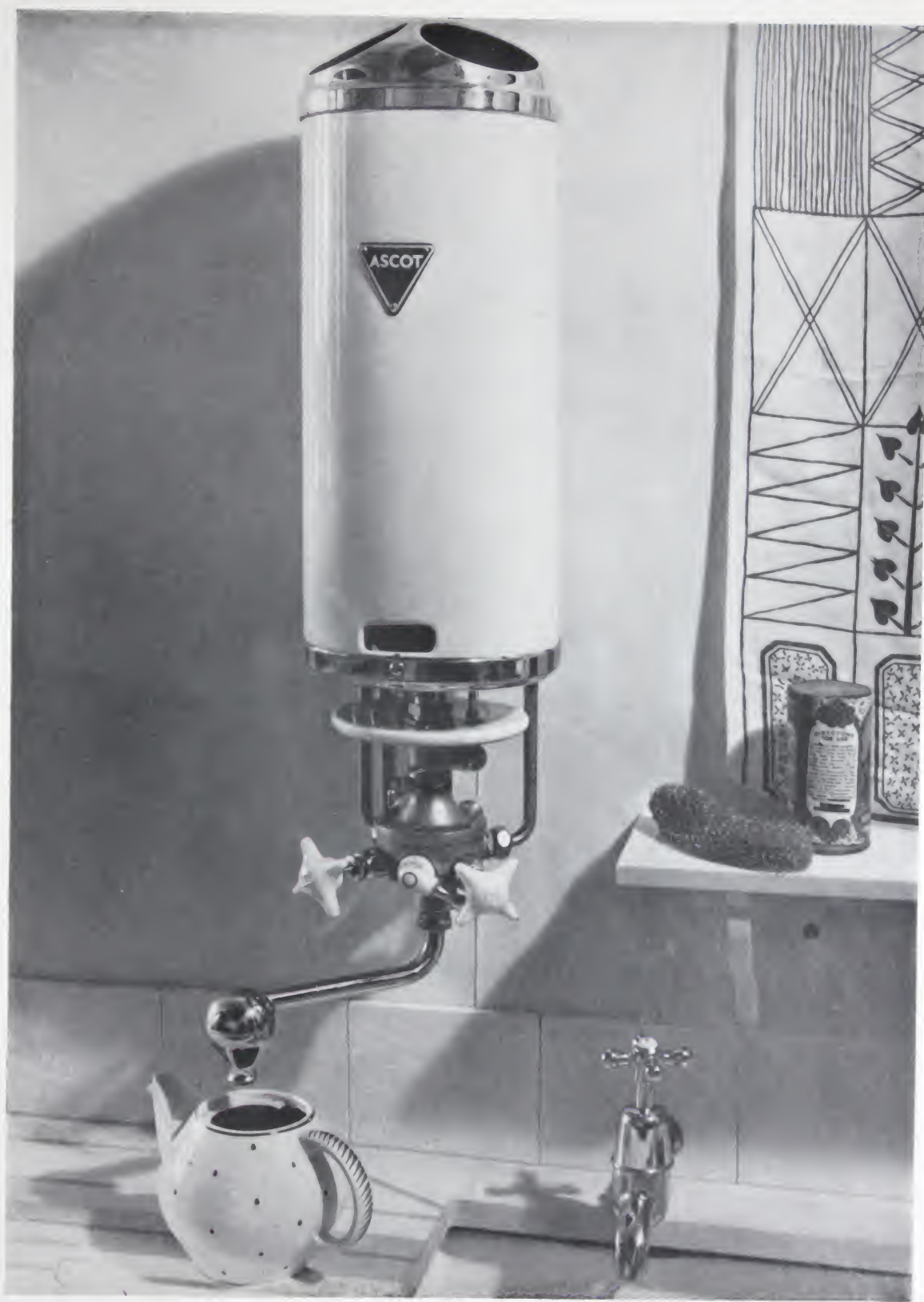
TYPE SG 32/I

ASCOT INSTANTANEOUS BATH GAS WATER HEATER



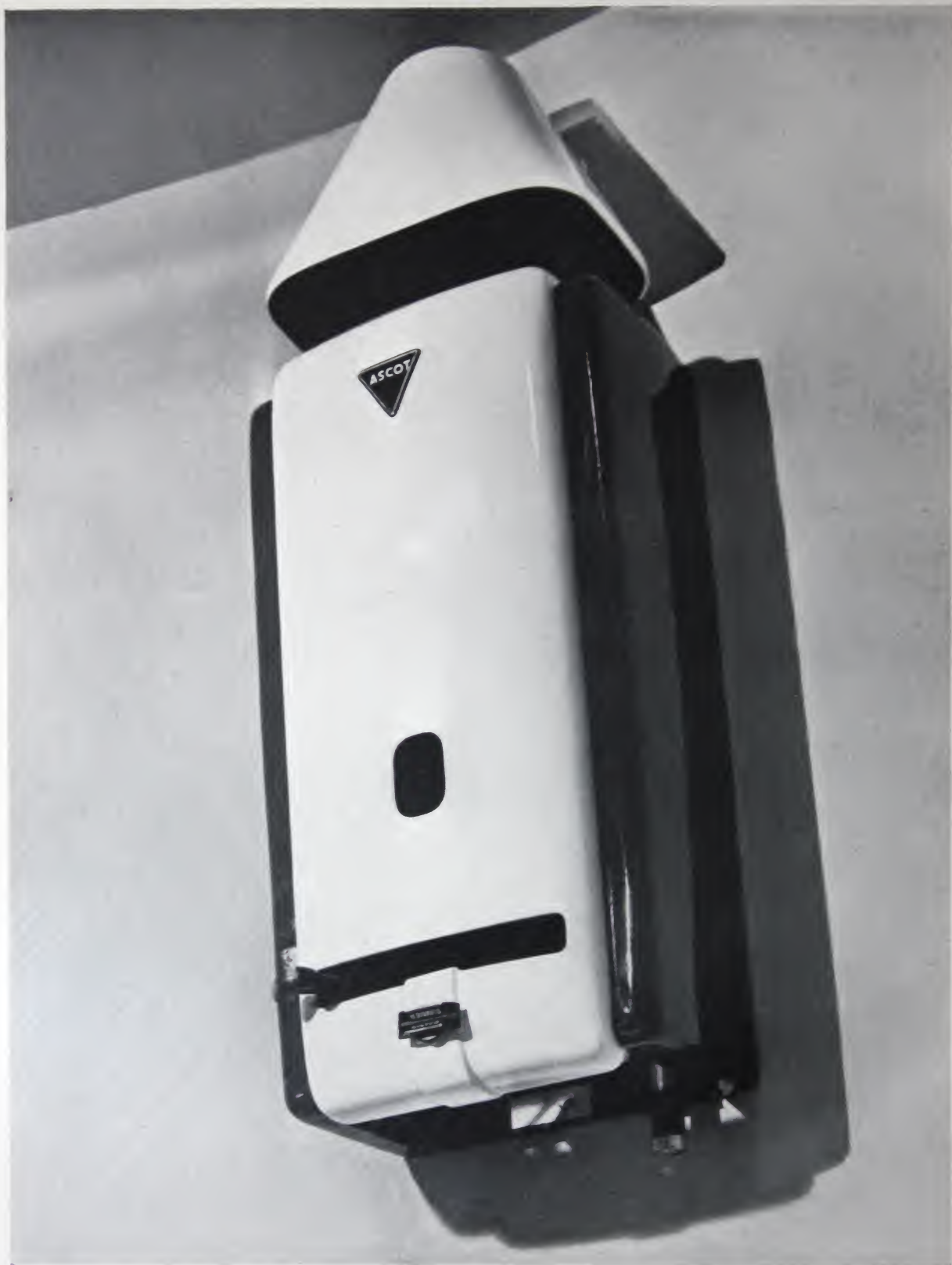
TYPE R 12/4

ASCOT INSTANTANEOUS SINK GAS WATER HEATER



TYPE RS 52/I

ASCOT INSTANTANEOUS GAS BOILING WATER HEATER



PROTOTYPE—ASCOT INSTANTANEOUS MULTI-POINT GAS WATER  
HEATER SHOWN AT "BRITAIN CAN MAKE IT" EXHIBITION 1946

SPECIFICATIONS OF  
FOUR ASCOT GAS  
WATER HEATERS

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CCA

# ASCOT INSTANTANEOUS MULTI-POINT GAS WATER HEATER TYPE NEA 32/6

DESCRIPTION	Instantaneous Multi-Point Gas Water Heater. Model designed for mains or tank supply.
OUTPUT	1,300 B.Th.U. per minute, or 3.25 gallons per minute raised through 40°F. or 1.3 gallons per minute raised through 100°F.
INPUT	1,625 B.Th.U. per minute or 3.25 cu. ft. per minute of gas having a calorific value of 500 B.Th.U. per cu. ft.
EXTERIOR FINISH	Heater and Draught Diverter are finished in white vitreous enamel with all visible fittings chromium plated.
MAIN GAS AND PILOT COCKS	Interlocking.
SUMMER AND WINTER TEMPERATURE COMPENSATOR	A Summer-Winter Temperature Compensator is fitted whereby the minimum flow to operate the automatic valve can be varied to suit summer and winter temperatures.
INSTALLATION	

Gas Connections Tapered B.S.P. male thread	$\frac{3}{4}$ "
Hot Water Connection Tapered B.S.P. male thread	$\frac{3}{4}$ "
Cold Water Connection Tapered B.S.P. male thread	$\frac{3}{4}$ "
Flue Socket to take Flue Pipe	5" int. dia.
Head of Water	10'-12' minimum
Size of Gas Supply Pipe Up to 15' run from meter Over 15' run from meter	$\frac{3}{4}$ " 1"
Size of Water Supply Pipes Hot Cold	$\frac{1}{2}$ " - $\frac{3}{4}$ " $\frac{1}{2}$ " - $\frac{3}{4}$ "
Capacity of meter in addition to other requirements	200 cu. ft./hour

#### MAIN GAS COCK

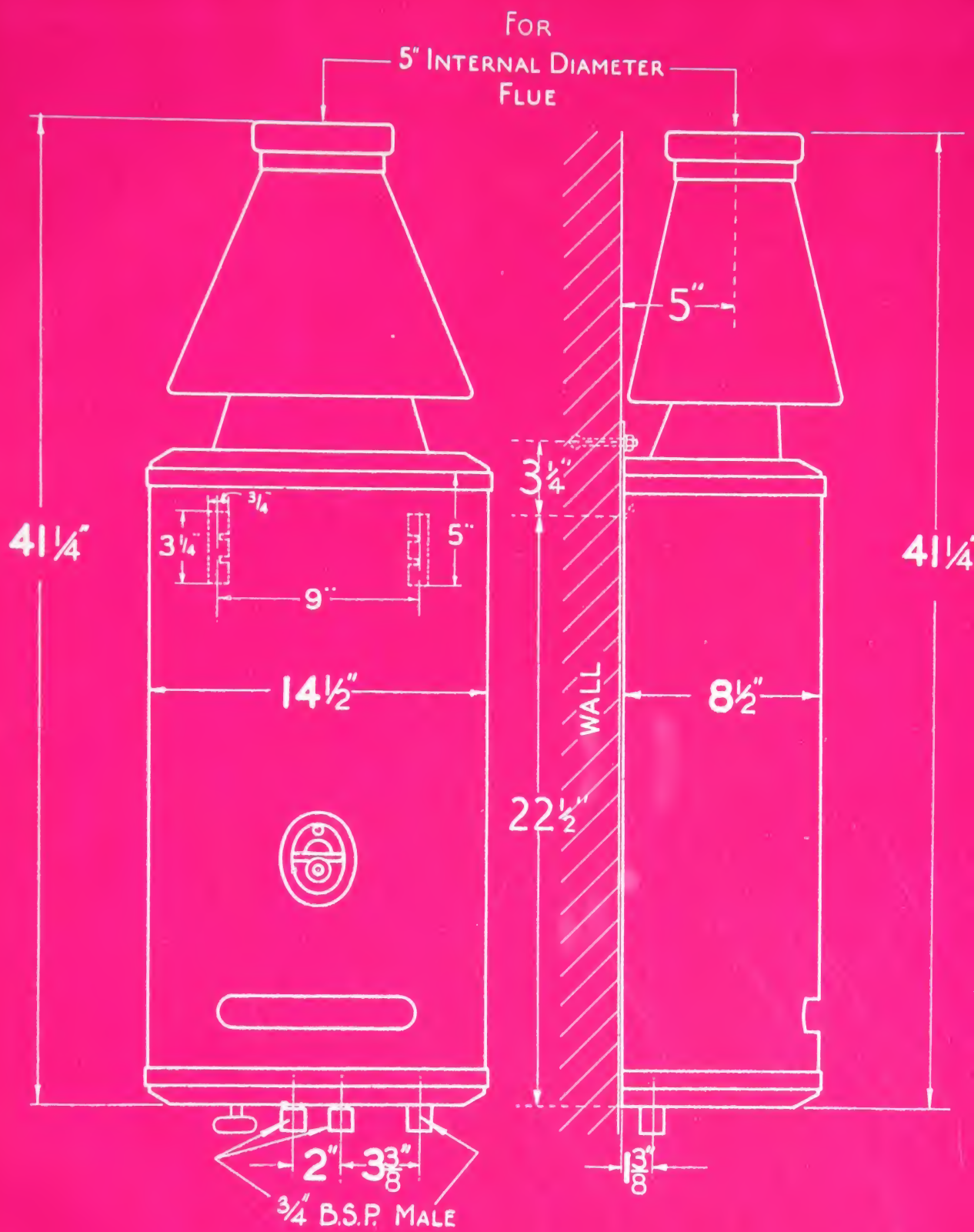
To be fitted near the heater.

#### MAIN WATER STOP-COCK

A stop-cock of a pattern approved by the local water authority to be fitted near the heater. This should have the valve secured so as to rotate freely and lift with the spindle.

#### FLUE

A socket to take a 5" internal diameter flue pipe is fitted for connecting to the effective flue installation necessary to all instantaneous multi-point gas water heaters.



TYPE NEA 32/6

ASCOT INSTANTANEOUS MULTI-POINT GAS WATER HEATER

# ASCOT INSTANTANEOUS BATH GAS WATER HEATER

## TYPE SG 32/I

DESCRIPTION	Single-Point Instantaneous Gas Water Heater. Model designed for mains or tank supply.
OUTPUT	1,300 B.Th.U. per minute. or 3.25 gallons per minute raised through 40°F. or 1.3 gallons per minute raised through 100°F.
INPUT	1,625 B.Th.U. per minute, or 3.25 cu. ft. per minute of gas having a calorific value of 500 B.Th.U. per cu. ft.
EXTERIOR FINISH	Heater and Draught Diverter are finished in white vitreous enamel with all visible fittings chromium plated.
MAIN GAS AND PILOT COCKS	Interlocking.
SUMMER AND WINTER TEMPERATURE COMPENSATOR	A temperature compensator is fitted whereby the minimum flow necessary to operate the automatic valve can be varied to suit winter and summer temperatures; in winter the compensator should be screwed in fully, and in summer fully out.
SPOUT	Standard : 12 in. Non-standard : 18 in. (supplied at an extra cost).
INSTALLATION	

Gas Connection Tapered B.S.P. male thread	$\frac{3}{4}$ "
Cold Water Connection Tapered B S P. male thread	$\frac{1}{2}$ "
Flue Socket to take Flue Pipe	5" int. dia.
Head of Water	8'-10' minimum
Size of Gas Supply Pipe Up to 15' run from meter Over 15' run from meter	$\frac{3}{4}$ " 1"
Size of Water Supply Pipes	$\frac{1}{2}$ " - $\frac{3}{4}$ "
Capacity of Meter in addition to other requirements	200 cu. ft. per hr.

### MAIN GAS COCK

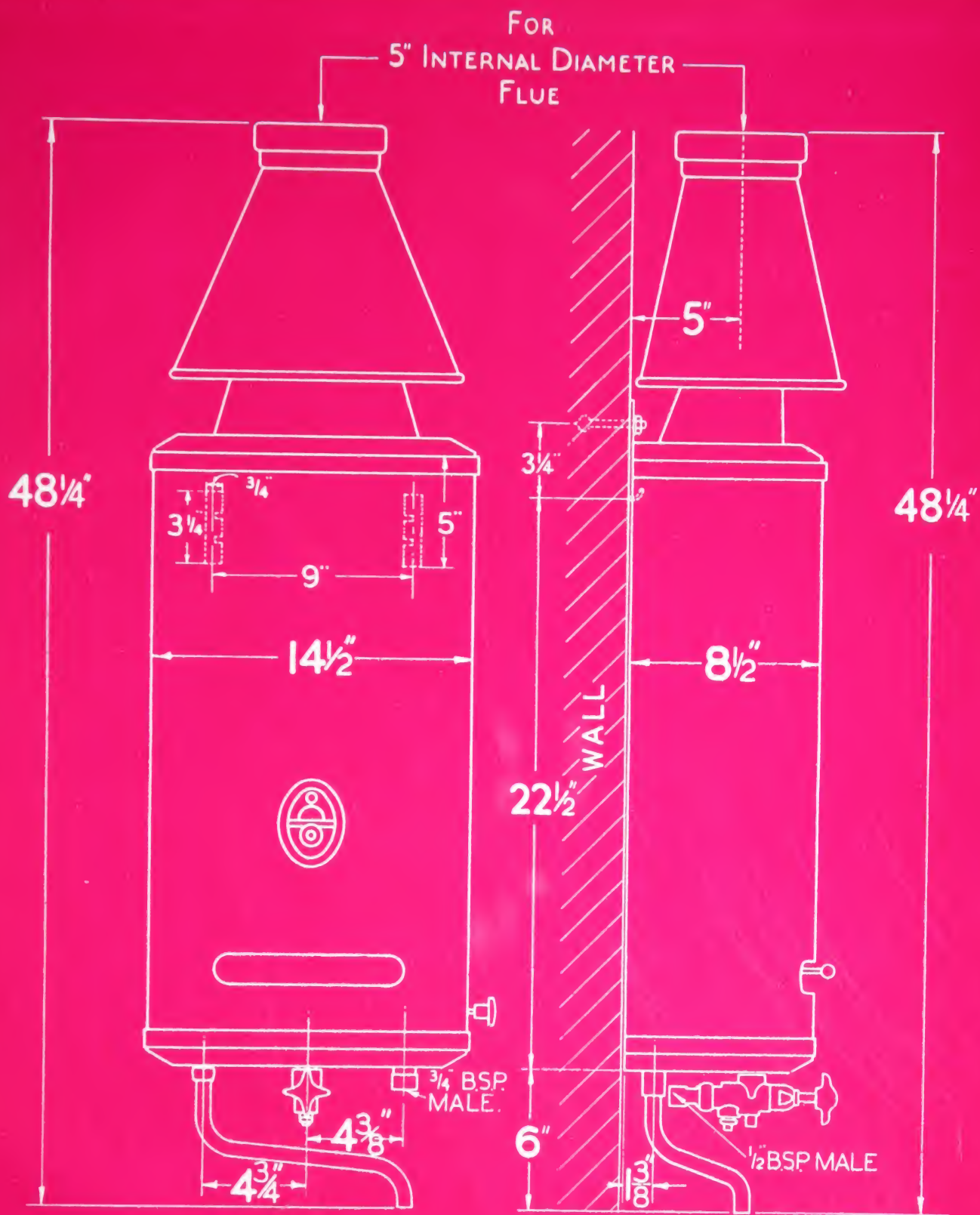
To be fitted near the heater.

### MAIN WATER STOP-COCK

A stop-cock of a pattern approved by the local water authority to be fitted near the heater. This should have the valve secured so as to rotate freely and lift with the spindle.

### FLUES

A socket to take a 5 in. internal diameter flue pipe is fitted for connecting to the effective flue installation which is essential to all instantaneous bath gas water heaters.



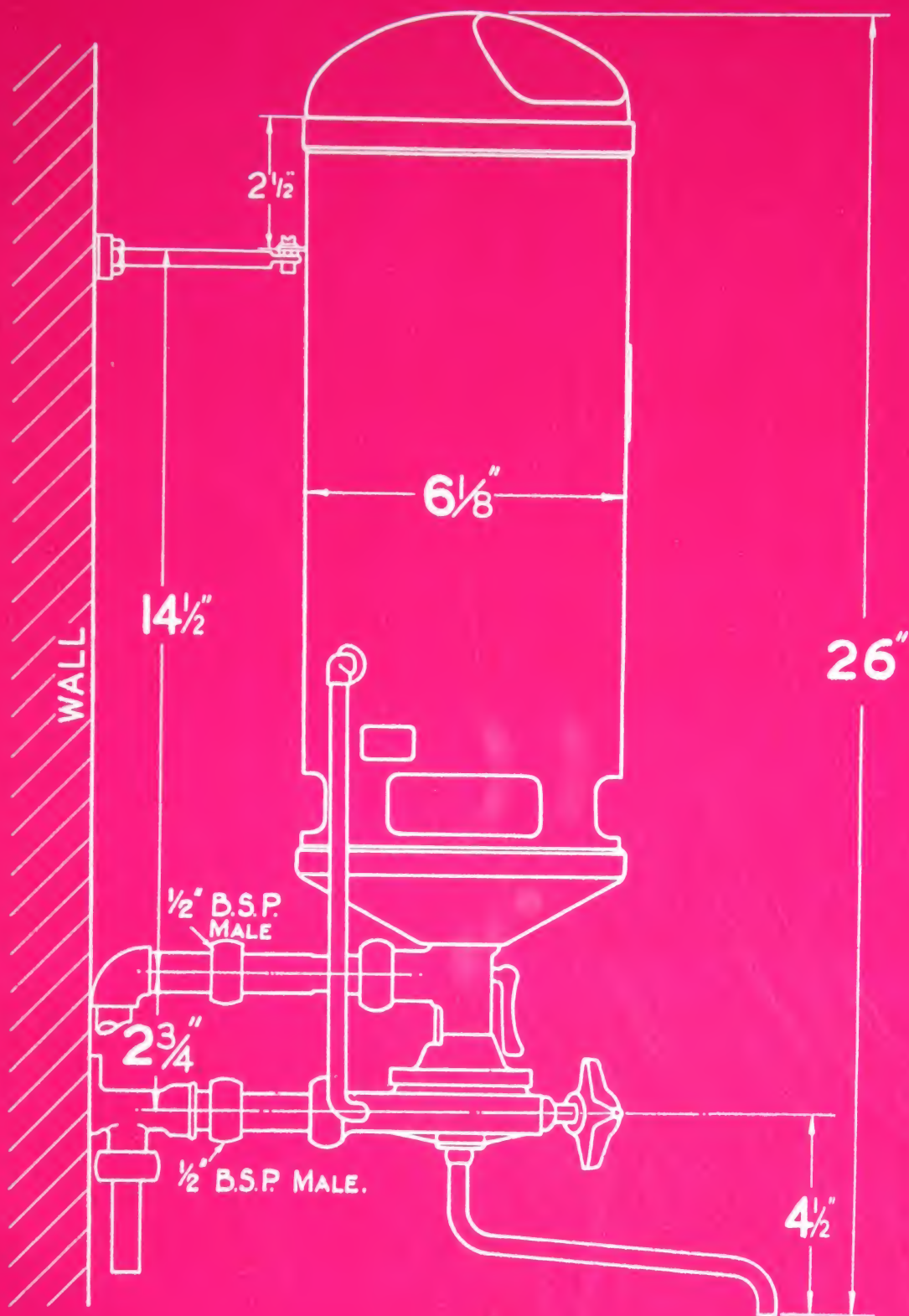
TYPE SG 32/I

ASCOT INSTANTANEOUS BATH GAS WATER HEATER

# ASCOT INSTANTANEOUS SINK GAS WATER HEATER

## TYPE R 12/4

DESCRIPTION	A Single-Point Instantaneous Gas Water Heater.
OUTPUT	500 B.Th.U. per minute, or 1.25 gallons per minute raised through 40°F., or 0.5 gallons per minute raised through 100°F.
INPUT	625 B.Th.U. per minute, or 1.25 cu. ft. per minute of gas having a calorific value of 500 B.Th.U. per cu.ft.
EXTERIOR FINISH	Finished in white vitreous enamel with all visible fittings chromium or nickel plated. Hot and cold taps provided.
MAIN GAS AND PILOT COCKS	Interlocking.
TOP COVER	A special top cover is fitted, which is designed to disperse the hot gases.
SPOUT	Standard : 6 in. Non-standard : 10 in. } 14 in. } <i>supplied at an extra cost</i> 18 in. }
GAS SUPPLY	<p>GAS CONNECTIONS Standard : Straight connection with union, 3 in. lining with <math>\frac{1}{2}</math> in. tapered B.S.P. male thread, or Bent connection with union and lining suitable for connection to <math>\frac{1}{2}</math> in. pipe.</p> <p>SIZE OF GAS SUPPLY PIPE Up to 15 ft. run from meter : <math>\frac{1}{2}</math> in. Over 15 ft. run from meter : <math>\frac{3}{4}</math> in.</p> <p>METER Rated capacity to be not less than 80 cu. ft. per hour, in addition to all other requirements.</p>
MAIN GAS COCK	Should be installed near the heater.
WATER SUPPLY	<p>COLD WATER CONNECTION Standard : Straight connection with union, 2 in. lining with <math>\frac{1}{2}</math> in. tapered B.S.P. male thread, or Bent connection with union and lining suitable for connection to <math>\frac{1}{2}</math> in. pipe. Supplied as extra, if required : Elbow union connection with wallplate and lining suitable for connection to <math>\frac{1}{2}</math> in. pipe.</p> <p>COLD WATER SUPPLY <math>\frac{1}{2}</math> in. to <math>\frac{3}{4}</math> in., according to length of run and available pressure.</p> <p>MAIN WATER STOP-COCK A stop-cock of a pattern approved by the local water authority should be fitted on the cold water supply pipe near to the heater to facilitate maintenance and regulation. The valve should be free to rotate and secured so as to lift with the spindle.</p> <p>HEAD OF WATER REQUIRED 15-20 ft.</p>
FLUE	No flue is normally necessary, but a flue and a draught diverter should be fitted if the appliance is installed in a badly ventilated room, or if the period of one individual operation exceeds 10 minutes. Size, if required, 3 in. internal diameter.
DRAUGHT DIVERTER	<i>Of special design—can be supplied if flue is to be fitted.</i>



TYPE R 12/4

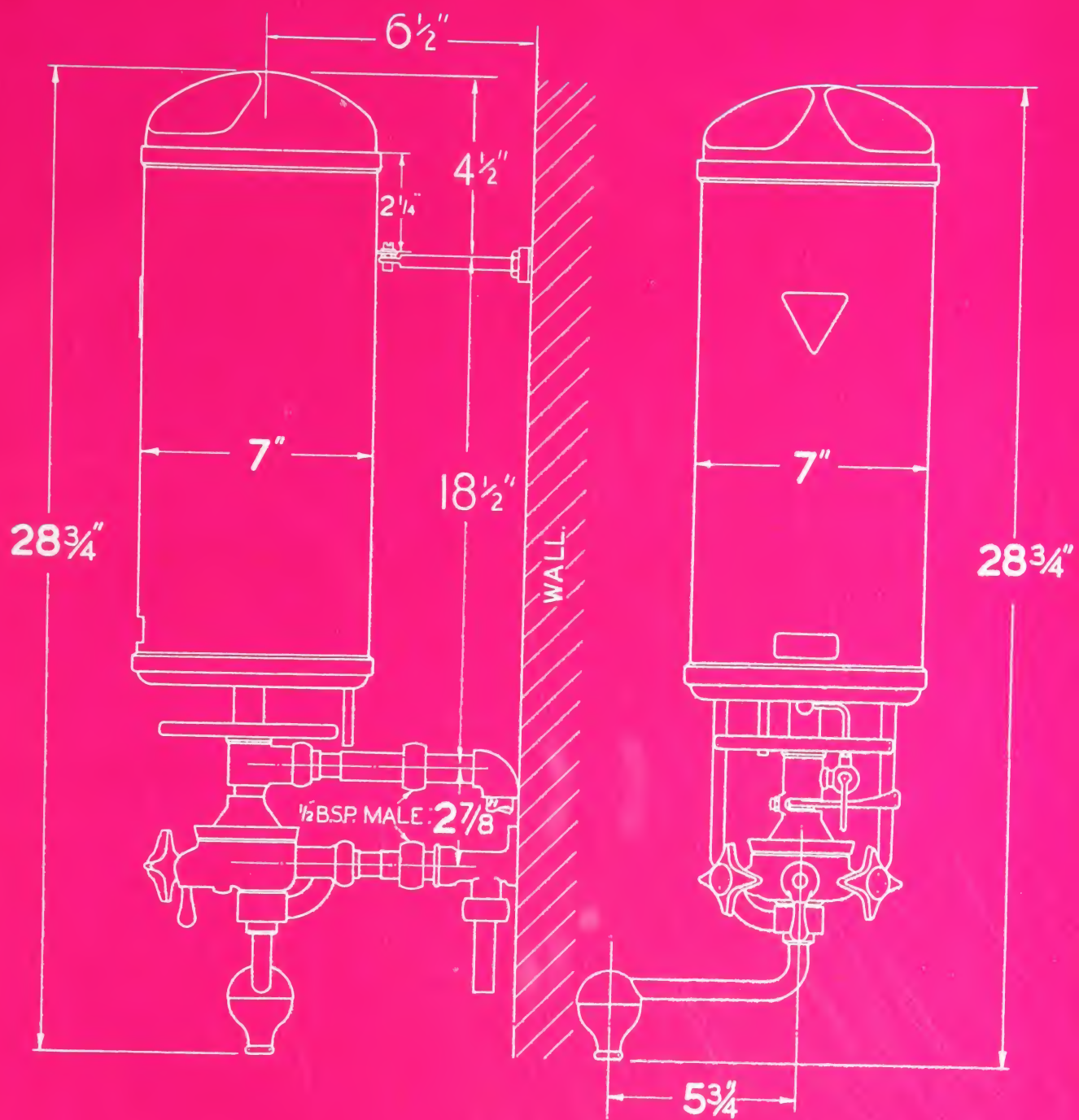
ASCOT INSTANTANEOUS SINK GAS WATER HEATER

# ASCOT INSTANTANEOUS GAS BOILING WATER HEATER

## TYPE RS 52/1

DESCRIPTION	A Single-Point Instantaneous Gas Water Heater for supplying continuous boiling water. Water at other temperature is obtainable.
OUTPUT	520 B.Th.U. per minute, or 1.3 gallons per minute raised through 40°F., or 0.5 gallons per minute raised through 104°F., or 2 to 3 pints of boiling water per minute.
INPUT	650 B.Th.U. per minute, or 1.3 cu. ft. per minute of gas having a calorific value of 500 B.Th.U. per cu. ft.
EXTERIOR FINISH	Finished in white vitreous enamel with all visible fittings chromium or nickel plated.
MAIN GAS AND PILOT COCKS	Interlocking.
TOP COVER	A special top cover is fitted, which is designed to disperse the hot gases.
SPOUT	Standard : 6 in. Non-standard : 10 in. } <i>supplied at an extra cost.</i> 14 in.
	All spouts for this appliance are fitted with a special bulb-shaped nozzle which separates the steam from the water and ensures an even flow of boiling water.
GAS SUPPLY	GAS CONNECTION Standard : Straight connection with union, 3 in. lining with $\frac{1}{2}$ in. tapered B.S.P. male thread, or Bent connection with union and lining suitable for connection to $\frac{1}{2}$ in. pipe. SIZE OF GAS SUPPLY PIPE Up to 15 ft. run from meter : $\frac{1}{2}$ in. Over 15 ft. run from meter : $\frac{3}{4}$ in. METER Rated capacity to be not less than 80 cu. ft. per hour, in addition to all other requirements. MAIN GAS COCK Should be installed near the heater.
WATER SUPPLY	COLD WATER CONNECTION Standard : Straight connection with union, 2 in. lining, $\frac{1}{2}$ in. tapered B.S.P. male thread. Supplied as extra : Elbow union connection with wallplate and lining suitable for connection to $\frac{1}{2}$ in. pipe. SIZE OF WATER SUPPLY PIPE $\frac{1}{2}$ in. to $\frac{3}{4}$ in., according to length of run and available pressure. MAIN WATER STOP-COCK A stop-cock of a pattern approved by the local water authority to be fitted near the heater. This should have the valve secured so as to rotate freely and lift with the spindle. HEAD OF WATER REQUIRED 15-20 ft.
FLUE	No flue is normally necessary, but a flue and draught diverter should be fitted if the heater is installed in a badly ventilated room, or if the period of one individual operation exceeds 10 minutes. Size, when required, 3 in. internal diameter.
DRAUGHT DIVERTER	<i>Of special design—can be supplied if flue is to be fitted.</i>

NOTE : This heater is primarily designed for domestic use in districts where the water pressure does not exceed 120 lbs. per square inch.



TYPE RS 52/I

ASCOT INSTANTANEOUS GAS BOILING WATER HEATER



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AT THE BAYNARD PRESS  
BY SANDERS PHILLIPS  
& COMPANY LIMITED  
CHRYSELL ROAD, S.W.9

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